

EFFECT OF SIX WEEKS YOGASANA TRAINING ON HEMATOLOGICAL PARAMETERS AND LIPID PROFILE

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ABSTRACT

Objective: To study the effect of six weeks Yogasana training on RBC Count, WBC count, Platelet count, Differential Leucocyte count, Blood Indices and Lipid profile in normal healthy individuals.

Material And Methods: 34 volunteer subjects [15 males and 19 females] attending Pattanjali Yoga Training Institute at M.E.S High school, Davangere were selected for study. Subjects were in the age group of 20-60 years. Training sessions were held regularly for about 6 weeks. Hematological parameters like Hb %, RBC Count, W.B.C Count, Platelet count, Differential count and blood indices were determined by Improved Version of automated hematology auto-analyzer Swelab alfa-Sweden. For this Hemogram study, 5 ml of blood was collected in EDTA Vial under aseptic precautions. Lipid profile were assessed by Elisa Kit methods.

Results: There was significant increase of Hb % , Mean corpuscular volume (MCV), Mean corpuscular Hemoglobin concentration (MCHC), Mean corpuscular Hemoglobin (MCH). R.B.C Count and Platelet count though increased was not statistically significant. There was decrease in Total Leucocyte count [TLC]. Differential Leucocyte count showed decrease in all types of W.B.C except Neutrophils which was statistically increased after training course.

Serum triglycerides (ST), Very low density lipoproteins (VLDL), LDL/HDL ratio, TC/HDL and S.C/HDL ratios were significantly decreased in subjects after undergoing yoga training course. High density lipoproteins (HDL) was significantly increased after training course thus depicting the beneficial effect of Yogasana on above parameters for a short duration of six weeks.

Key Words : Yoga-asanas, Blood parameters, Lipid profile.

INTRODUCTION

The term "yoga" and English word "yoke" are derived from Sanskrit root "Yuj" which means union. Yoga is a

psycho-somatic-spiritual discipline for achieving union and harmony between our mind, body and soul and ultimate union of our individual consciousness with universal consciousness.¹ Being holistic, it is best means for achieving physical, mental, social and spiritual well being of the practitioners. Healthy life can be considered as a byproduct of practicing yogic techniques since it has been observed that yoga practioners are physically and mentally healthier and have better coping skills to stressors than normal population. Yoga is widely practiced and globally accepted. Hence, it can be very well integrated as a health promoting tool in our society.² It has been well substantiated that practice of yogasana has beneficial effect on biochemical and physiological functions. There are few studies involving subjects of Indian origin to study the effect of Short term Yogasana training (6 weeks) on hematological parameters and lipid profile.

Hence, we planned to undertake a study on effect of six weeks Yogasana training on R.B.C Count, WBC Count, Platelet Count, Differential Leucocyte count, Blood indices and Lipid profile which includes Total Cholesterol (TC), LDL-Cholesterol (LDL-C), VLDL-Cholesterol (VLDL), HDL-Cholesterol (HDL-C) and Triglycerides (TG).

MATERIALS AND METHODS

Present study was done on 34 volunteer subjects [15 males and 19 females] attending Pattanjali Yoga Training Institute at M.E.S High school, Davangere. Subjects were in the age group of 20-60 years. Training sessions were held regularly for about 6 weeks between 5.30 A.M and 7.30 A.M. Hematological parameters like Hb %, RBC Count, W.B.C Count, Platelet count, Differential count and blood indices were determined by Improved Version of automated hematology auto-analyzer Swelab alfa-Sweden. For this Hemogram study, 5 ml of blood was collected in EDTA Vial under aseptic precautions.³ Lipid profile were assessed by Elisa Kit methods.^{4,5}

All the above parameters were tested initially and after completion of 6 weeks Yogasana training course. The set of asanas practiced during training sessions are given in Table I. Informed consent was taken from the subjects for their participation in the study.

RESULTS

Table 2 shows Hematological parameters in subjects participated before and after Yogasana training course. There was significant increase of Hb %, Mean corpuscular volume (MCV), Mean corpuscular Hemoglobin

TABLE I : YOGA POSTURES

<p>1. Calmness and Prayer. Shanti Mantra.</p> <p>2. Breathing exercise. Abdomen Breathing. [Udar Swasha] Chest Breathing [Ura Swasha]. Neck Breathing. [Griva Swasha] Hand stretch Breathing [Purna swasha] Cat/Tiger Breathing. [Murgala Swasha or Vaghra swasha]. Dog Breathing [Swana Swasha] Trunk Breathing [Kati Swasha].</p> <p>3. Dyanamic Yoga Postures.</p> <p>1. Foot finger movement [Padanguli Chalana] 2. Pada chalana [Foot movement]. 3. Pada pashrva chalane . 4. Pada Bhramana [Savya - Apasavya Clockwise and Anticlockwise rotation] 5. Knee joint movement [Janu Kilu Chalane] 6. Knee joint rotation [Janu Kilu Bhramana] 7. Uru Sandhi Chalane [Hip Joint Movement] 8. Paripurna Pada Bhramana [Full leg Joint rotation]. clock wise and anticlockwise</p>	<p>4. Agantilagi Cycling [One leg, two legs] Sethu Bandha Kathichalane. Supthabadha konasu chalane. Ardha Jathara Parivarthanasana chalane. Halasana-Shavasana- Paschimothasana-Shavasana-Chalane. Eka Padaprasaranasane Chalane. Ardha sama Konasana Chalane. Prasarita Padosthasana Chalane. Uthirta Trikosana chalane. Hastha Pasharva Chalane. [4 Types] Ninthaleota [Running on standing] Swana swasa Sira bhramana. [Head rolling] Adomukha virasana.</p>	<p>5. Standing postures: Tadasana. Type 1. Urdwaha Hasthasana Urdwabadaguli. Namaskarasana. Urdwaha namaskarasana. Tadasana. [Gomukhasana - eka-dvi hasth] Gomukhasana- Hasthamudra Paschima namaskara. Ardhakati chakrasana. Adhomukha swasana. Shasomkasana. Vajrasana. Virasana-Parvatasana. Svastikasana. Padmasana. Gomukhasana Pashcimostasana. Namaskara Pavanamuktasana Savasana.</p>	<p>6]1. Ardhakati chakrasana. 2. Uthita Tikrosana. 3. Veerabhadrasana Type 2 7]1. Uthiti Parsvakonasana 2. Veerabhadrasana Type 1. 3. Ardachandrasana-2 4. Veerabhadrasana Type -3 8] Parirutha Trikosana. 9] Paschothasana Hasthapadagala Pakka. 10] Prasarita Padosthasana. 11. SITTING POSTURES. 1. Dandasana 2. Urvadandasana. 3. Badhakonasana (Butterfly) 10. Janusirsana 11. Veerasana 6 vidha. 12. SARVANGASANA . 1. Ekapada Sarvagasana. 2. Parsavakpada. 3. Halasana. 4. Karna Pidasana. 5. Supta Konasana. 6. Parsva Halasana. 7. Viparita Karni.</p>
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concentration (MCHC), Mean corpuscular Hemoglobin (MCH). R.B.C Count and Platelet count though increased was not statistically significant. There was decrease in Total Leucocyte count [TLC]. Differential Leucocyte count showed decrease in all types of W.B.C except Neutrophils which was statistically increased after training course.

Table 3 depicts the Mean \pm SD values of serum TC, LDL-C, HDL-C, VLDL and TG. Serum triglycerides (ST), Very low density lipoproteins (VLDL), LDL/HDL ratio, TC/HDL and S.C/HDL ratios were significantly decreased in subjects after undergoing yoga training course. High density lipoproteins (HDL) was significantly increased after training course.

Table 2: Hematological Parameters Before and after Yogasana Training

PARAMETERS	BEFORE YOGA		AFTER YOGA		DIFFERENCE	SIGNIFICANCE	
	MEAN	S.D	MEAN	S.D		t-value	p-value
Hb [%]	13.1	2	13.8	2.1	-0.7	2.8	0.008*
RBC [millions/cumm]	4.7	0.7	4.8	0.6	-0.1	1.63	0.11
WBC [/cumm]	7564.7	1492.6	7344.1	1399	220.6	1.05	0.3
Platelets [lakhs/cumm]	2.6	0.7	2.8	0.5	-0.2	1.77	0.09
PCV	38	5.8	38.4	5.5	-0.4	0.48	0.63
MCV	80.3	7.2	79.4	6.6	1	2.01	0.05*
MCH	27.6	2.8	28.6	3	-0.1	3.99	0**
MCHC	34.2	1	35.9	1.3	-1.7	10.43	0**
Neutrophil [%]	57.3	7.5	60.2	5.8	-2.9	2.22	0.03*
Lymphocyte [%]	35	7.3	34.2	6.3	0.8	0.65	0.52
Eosinophil [%]	2.6	0.7	2.4	0.9	0.8	1.23	0.23
Meonocyt[%]	3.8	1.1	3.6	0.9	0.2	0.96	0.34
Basophil [%]	0.1	0.2	0	0	0.1	1.44	0.16

*Significant ** Highly significant

DISCUSSION

Documented scientific evidence strongly indicates that yoga has promotive, preventive as well as curative potential. As a non-pharmaco therapeutic and safe modality it can be used as an effective lifestyle adjunct to medical treatment to reduce drug dosage and improve quality of life of patients. It is to be emphasized that yoga is very effective for prevention as well as management of all pervading stress and stress related disorders. Modern medicine is very effective in controlling infections, performing surgeries and managing diseases. However, it

Table 3: Lipid Profile And Fasting Blood Glucose Levels Before And After Yogasana Training

PARAMETERS	BEFORE YOGA		AFTER YOGA		DIFFERENCE	SIGNIFICANCE	
	MEAN	S.D	MEAN	S.D		t-value	p-value
FG	107.1	36.7	94.9	16.7	12.2	1.72	0.1
SC	177.7	13.8	174.4	18.4	3.3	1	0.32
ST	175.1	48	131.3	30	43.8	6.53	0**
HDL	41.7	2.4	44.2	3.3	-2.5	3.69	0.001*
LDL	108.9	13.4	104.1	16.2	4.9	1.33	0.19
VLDL	35.6	9.1	26.5	5.8	9.1	6.75	0**
LDL/HDL	2.62	0.36	2.39	0.54	0.23	2.05	0.05*
TC/HDL	4.11	1.05	3.06	0.86	1.06	5.12	0**
SC/HDL	4.28	0.48	3.39	0.69	0.29	2.28	0.03*

*Significant **Highly significant

has limited role in stress based, chronic degenerative, old age and life style related disorders which are bane of modern society. Yoga has been very effective in these conditions.

Practice of Yogasana improves biochemical profile indicating anti-stress and antioxidant effect, important in production of degenerative disorders.

Earlier studies have shown significant improvement in RBC with practice of Yogasana for about 12 weeks. Apparent increase in the concentration of red blood corpuscles is due to mobilization of plasma from blood to tissue fluid. Besides this, Yogic asanas, pranayama and exercise makes a greater amount of oxygen supply thus putting into circulation the red blood corpuscles stored in spleen and accessory spleen. Asanas and exercise also increase the myoglobin pigment which is helpful to supply more amount of oxygen.⁶ Present study reveals increase in RBC Count after 6 weeks training but it was not statistically significant. But there was significant improvement in Hemoglobin, MCH, MCHC content in subjects after 6 weeks training course.

Yogic asanas and pranayamas minimize all types of stress of body. Leucocyte count increase only when there is stress and allergy but the effect of yogic asanas decreases total leucocyte count indicating anti-stress and allergy but the effect of yogic asana decreases total leucocyte

count indicating anti-stress mechanisms of the body whether it is physical, physiological or psychological. Increase in Neutrophil count in present study is because of biochemical reaction in the body as the Neutrophils function as the first line of defense involving in process of phagocytosis. Present investigations also supports earlier findings by Winter 1985, King Roy 1999, Shridharan K et al., Mujumdar 2000 and Malathi 2001.^{7,8}

There was no significant change in case of platelet count before and after Yogasana training period because 6 weeks Yogasana training might not be sufficient to bring about significant change in this variable.

Table III shows decrease in serum cholesterol, significant decrease in serum triglycerides, along with significant increase in HDL-C after 6 weeks of Yogasana training. There was decrease in LDL-C and significant decrease of VLDL after the training course. The review showed beneficial effect of Yogasana on blood glucose level and cholesterol levels. Earlier studies have shown that practice of Yoga is associated with significant decrease in cholesterol among subjects with cardiovascular diseases, atherosclerosis, angina, hypertension and Type 2 Diabetes Mellitus at different duration of Yoga.⁹⁻¹⁵

Ability of HDL to retard the oxidation of LDL can prevent the pro-inflammatory effects of oxidized LDL (oxy-LDL) on the endothelium. Thus, HDL can prevent oxy-LDL induced production of monocyte chemotactic protein-1, intracellular adhesion molecule-1 and vascular cell adhesion molecule. This retards monocyte endothelium interaction, the first stage in inflammatory process in atherosclerosis.¹⁶ Cardioprotective effect of HDL-C is mainly exerted by facilitating the reverse cholesterol and other adjuvant effects such as anti-inflammatory, anti-oxidants, anti-coagulant and fibrinolysis. Recently published data studies indicate a regulatory role for HDL-C to scavenger receptors lead to activation of endothelial nitric oxide synthetase and therefore enhances vasorelaxation.¹⁷

The improvement in lipid profile parameters after yoga could be due to increased hepatic lipase and lipoprotein lipase at cellular level which affects the metabolism of lipoprotein and thus increase the uptake of triglycerides by adipose tissues. Better ability to overcome stress can be cited as a possible mechanism for improvement in lipid profile.^{18,19}

REFERENCES

1. Madanmohan. Introducing Yog to Medical students-The JIPMER experience. Advanced centre for yoga Theraphy, Education and Research 2008.
2. Madanmohan, Mahadevan SK, Balakrishnan S, Gopalkrishnan M, Prakash ES. Effect of six week yoga training on weight loss following step test, respiratory pressure, handgrip strength and handgrip endurance in young healthy subjects. *Indian J of Physiol and Pharmacol* 2008;52: 164-70.
3. Boyd JC, Hawker CD. Automation in clinical laboratory In Burtis CA, Ashwood CR, Bruns DE (Eds). TETZ text book of clinical chemistry and molecular diagnostics, New Delhi, India, Elsevier Pvt Ltd; 2006; pp293.
4. Foosati P. Serum Triglycerides determined colorimetrically with an enzyme that produces H₂O₂. *Clin Chem* 1982; 28: 2077-2080.
5. Richmond W. Preparation and properties of Cholesterol oxidase from *Norcardia* sp and its application to Enzymatic assay of Total cholesterol in serum. *Clin chem.* 1973;19:1350-56.
6. Rajendra Singh, Ashutosh Kumar Tiwari, VK Singh. Comparative effects of Yogic practices and Exercise on Hematological variables. *Human Kinetics*, 1(2): 33.
7. King Roy MD and Ann Brownstone. Neurophysiology of Yoga Meditation. *International Journal of Yoga Theraphy* 1999;9:9-17.
8. Malathi A. Promotive, Prophylactic benefits of Yogic practise in middle aged women. www.iayt.org.
9. Yang K.A review of Yoga programs for leading risk factors of chronic diseases. *Evidence based Comple Alt Medicine* 2007;4(4): 487-91.
10. Mahajan AS, Reddy KS, Sachdeva U. Lipid profile of coronary risk subject following yogic lifestyle intervention. *Indian Heart J* 1999;51(1):37-40.
11. Agarwal RP, Aradhana, Hussain S, Beniwal R, Subir M, Kochar DK et al. Influence of yogic treatment on quality of life outcomes, glycemic controls and risk factors in diabetes mellitus. *Int J of Diab Dev countries* 2003;23:130-34.
12. Satyajit RK. Yoga in cardiac health (A Review). *Eur J Cardiovascular Prevent Rehab* 2004;11:369-75.
13. Bijlani RL, Vampati RP, Yadav RK, Ray RB, Gupta V, Sharma R et al. A brief but comprehensive lifestyle education for Lifestyle disease & Diabetes Mellitus. *J Alt Comple Med* 2005;11(2):267-74.
14. Damodaran A, Malathi A, Patil N, Shah N, Suryavenshi, Marthe S et al. Therapeutic potential of yoga practices in modifying cardiovascular risk profile in middle age men and women. *J Assoc Phy India* 2002;50:640-63
15. Gorden LA, Morrison EY, Mcgrowder DA, Young R, Fraser YT, Zamora ET et al. Effect of exercise Theraphy on lipid profile and oxidative stress indicators in patients with type 2 diabetes mellitus. *BMC J Alt Comple Med* 2008;8: 21.
16. Mackness B, Mackness M. High density lipoproteins. Why all the fuss? *Ann Clin Biochem* 2009;46:5-7.
17. Shilpa S, Bairy KL. Guest editorial HDL-C as a New Paradigm in Atherosclerotic diseases. *Indian Journal of Physiol and Pharmacol* 2008;52(4):319-326.
18. Delmonte MM. Biochemical indices associated with meditation practise. A literature review. *Neurosci Biobehav Rev* 1985;9: 557-61
19. Tulpule TH, Shah HM, Shah HJ, Haveliwala HK. Yogic exercises in the management of Ischaemic heart disease. *Int Heart J* 1971; 23(4):259-64.