



## COMPARATIVE EFFECTS OF YOGIC PRACTICES AND EXERCISE ON HAEMATOLOGICAL VARIABLES

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### **Abstract**

*The aim of present study was to observe changes induced by yogic practices and exercise and Combination of both in hematological parameters. This study was carried out at kamaraj senior sec secondary school, Chidambaram. 80 boys were selected for the purpose of this study. They were divided in to three experimental and one control group. The training schedules were prepared for three experimental group's namely group – 1 yogic group, group – 2 exercise group, group – 3 combinations of yoga and exercise, and group - 4 control group. The training period was 5 days in a week for 12 weeks. The difference between the pre-test and post-test means of each group in chosen variables were tested by applying t test. In order to find out the differential effects of the three experimental method of training, analysis of variance and co-variance were used to find out which of the differences of paired means were significant, the level of confidence was 0.05. The 5ml blood was taken before experiment for the estimation of R.B.C, W.B.C. and Platelet count. And after the experimental program of 12 weeks, 5 ml, blood was again taken for the same purpose. Results show that the R.B.C, count increases significantly, W.B.C. count decrease significantly but no significant change was found on platelets.*

**Key Words** - Yogic practices, blood cell study, R.B.C, W.B.C, Platelets.

### **INTRODUCTION**

Today yogic practices have become popular throughout the world, but there are many misconceptions about these practices due to the lack of scientific information about them. Yogic practices are generally looked upon as exercise physiology. The physiology of yogic practices differs greatly from that of exercise physiology. The scientific nature of the yogic practices was first revealed when late swami Kuvalyanada started his scientific research in the field of yoga 1924. These research findings could remove the mystical sheath over it. He showed pleasant posture produces mental equilibrium and prevents fickleness of mind. Asanas are not merely gymnastic exercise: they are posture. Yoga- is a traditional

Indian system of physical culture or fitness also claims to have better health status of general public (Diagambar.S.1970; Lyengar.1974, Nanwani, 1998, Malathi 2001) our ancestors also experienced that appropriate practice of yoga significantly reduces the risk factors of ill-health problems by enhancing cardiac efficiency. It is therefore necessary to understand that yoga is not only a philosophy but it also deals with metaphysical, ontological, psychological, theological and physiological.

Yoga is highly therapeutic. Some of the ailments proven to be relieved, reversed and even healed through the practice of yoga are: allergies, Alzheimer disease, anemia, anger, anxiety, arthntis, asthma, back pain,

bronchitis, cancer, carpal tunnel syndrome, chronic fatigue, colitis, constipation, depression, diabetes, and epilepsy and eye problems.

The blood serves as a principal transport medium of the body carrying oxygen, nutrients, and chemical messengers to the tissues and waste products and synthesized metabolites away. The circulatory system provides access to all cells of the body for materials ingested or prepared elsewhere in the organism. Thus blood plays many important roles in coordinating the individual's cells in to a whole complex organism. This is accomplished by presence in the fluid of dispersed or dissolved nutrients, metabolites, electrolytes, hormones, substances to counteract infection and hemorrhage and by equilibria between the cell and the blood stream so that homeostasis with respect to temperature, oxidation, reduction potential and ionic concentration is maintained throughout the organism (Sajwan & Uppal 1999).

The blood consists of the two parts a fluid part and a solid part of the corpuscles. The function of the blood as a whole, are of course, the sum total of those of its components – corpuscles, salts, proteins and other substances. The major function of RBC is to transport hemoglobin, which in turn carries oxygen from the lungs to the tissue, volume of blood and hemoglobin contents in the blood increased by training. The numbers of RBC is definitely affected by yoga and exercise (Tamrakar, A. 2003).

Holmgren (1963) found in his study that intermittent long term training resulted in an increase in physical working capacity in a steady state, total hemoglobin and blood volume. The major function of red blood cells is to transport hemoglobin, which in turn carries oxygen from the lungs to the tissue. In some lower animals hemoglobin circulates as free protein in the plasma, not enclosed in red blood cells,

however, when it is free in the plasma of the human being, approximately 3 percent of it leaks through the capillary membrane in to the tissue spaces or through the glomerular membrane of kidney in to Bowman's capsule each time blood through the capillaries. Therefore, for hemoglobin to remain in the blood stream, it must exist in red blood cells there are approximately 4.5-5 million RBC's per micro-liter of blood.

The leukocytes are the mobile unit of the body's protective system they are formed partially in the bone marrow (the granulocytes and monocytes, and a few lymphocytes) and partially in the lymph tissue (lymphocytes and plasma cells), but after formation they are transported in the blood to the different parts of the body where they are to be used. Leucocytes play an important role in both defense and restorative processes in the organism increased in physical working capacity in a steady state, total hemoglobin and blood volume. Their main function is phagocytosis, production of antibodies, and destruction and removal of toxins of protein origin.

An increase in their number is known as leucocytosis, and a decrease as leucopenia, leucocytosis is characteristic of a number of pathological (inflammatory) processes but it may also be encountered in healthy individuals (during digestion of food, muscular work, in pain, during the physical or physiological stress and during the strong emotions) an increase of the leucocyte count to 11000 has been observed in students taking a difficult examination. (Babsky et al. vol -1, 1989) Rashida bhati (2007) found in his study that exercise stress leads to significant increase in total white blood cell counts in both male & female subjects. This study was an attempt to investigate the effects of yoga, exercise and combination of both on RBC, WBC and Platelets of school going children,

objectives are directed to importance of experimental programme for affecting the hematological well beings.

### METHODOLOGY

The study was conducted on 80 male students of kamaraj senior sec school Chidambaram age ranged from 14 to 17 years; the subjects were equally divided in to three experimental and one control group. 5 ml, blood was drawn for the estimation of the chosen hematological variables (R.B.C., W.B.C. and Platelets), before and after the 12 weeks training programme. The blood sample were Tested in to a standard Blood Testing Center of Chidambaram named. The

training schedules were prepared for three experimental group's namely group – 1 yogic group, group – 2 exercise group, group – 3 combinations of yoga and exercise, and group - 4 control group. The training period was 5 days in a week for 12 weeks. The difference between the pre-test and post-test means of each group in chosen variables were tested by applying t test. In order to find out the differential effects of the three experimental method of training, analysis of variance and co- variance were used to find out which of the differences of paired means were significant, the level of confidence was 0.05

### RESULTS

**Table - 1**

**Significance of difference between pre and control group in all chosen variables Post mean differences of RBCs after the experiment**

Variables	Group	Pre test	Post test	Diff.	Dm	T ratio
Red Blood corpuscles	Yoga	3.36	4.0165	0.66	0.0578	11.32*
	Exercise	3.325	3.937	0.61	0.065	9.39*
	Combined	3.19	4.025	0.835	0.0336	24.71*
	control	3.245	3.24	.005	0.243	0.2057
White blood corpuscles	Yoga	7350	6687.5	-662.5	116.60	-5.68*
	Exercise	7157.5	6817.5	-140	254.51	-0.549
	Combined	7241.5	6783	-478.5	256.11	-1.86*
	control	7285	7352.5	67.5	88.19	0.76
Platelets	Yoga	3.15	3.175	0.025	0.03	0.8333
	Exercise	3.15	3.18	0.03	0.04	0.75
	Combined	3.165	3.22	0.055	0.04	1.375
	control	3.15	3.16	0.01	0.03	0.33

#### \*Significant at 0.05 level

It is evident from table - 1 that all three experimental groups have shown significant change in R.B.C. in case of W.B.C the yoga and combined groups have shown significant effect but in the case of platelets the difference between the means were not found to be significant in the

experimental and control groups. The data was further subjected to analysis of variance and co- variance if there were any significant differences among the groups. The analysis of variance and co- variance in the table – 2

**Table - 2**  
**Analysis of variance and co- variance of the means of three experimental groups and the control group in all chosen variables**

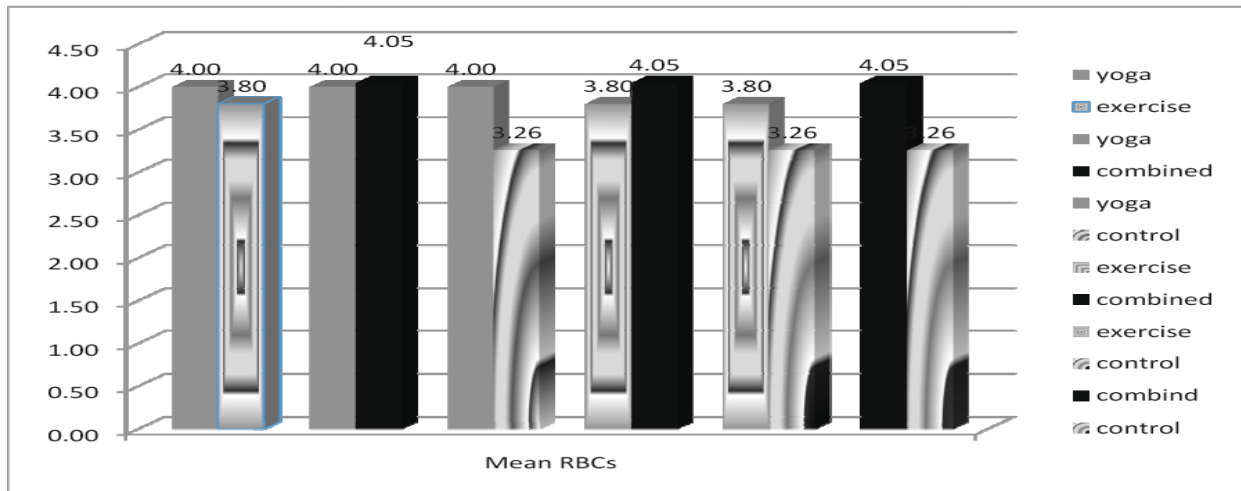
Variables	Source of	df	Sum of	Mean Sum	F ratio
Red Blood corpuscles	Pre- test	B : 3 W :76	0.355 10.953	0.1183 0.1441	0.82
	Post- test	B : 3 W :76	8.4413 7.5071	2.8138 0.0987	
	Adjusted post -test	B : 3 W :76	7.97373 2.4370	2.6579 0.0324	28.50* 81.795*
White blood corpuscles	Pre- test	B : 3 W :76	391290 153576330	130430 2020741.18	0.06454
	Post- test	B : 3 W :76	5399953.75 110544945	1799985 1454539	
	Adjusted post -test	B : 3 W :76	5500159.79 40740091.71	1833387 543201.2	1.222374 3.375*
Platelets	Pre- test	B : 3 W :76	0.0034 2.1355	0.001125 0.028099	0.04
	Post- test	B : 3 W :76	0.0393 1.8695	0.013125 0.024599	
	Adjusted post -test	B : 3 W :76	0.029898 1.402162	0.009966 0.018695	0.5335 0.53377

**\*Significant at 0.05 level**

It is evident from table - 2 in the case of R.B.C. and W.B.C. the post-test mean and adjusted post mean are found to be significant. Whereas in the case of platelets post-test mean and adjusted post-test mean was not found to be significant. Since f ratio are found to be significant in

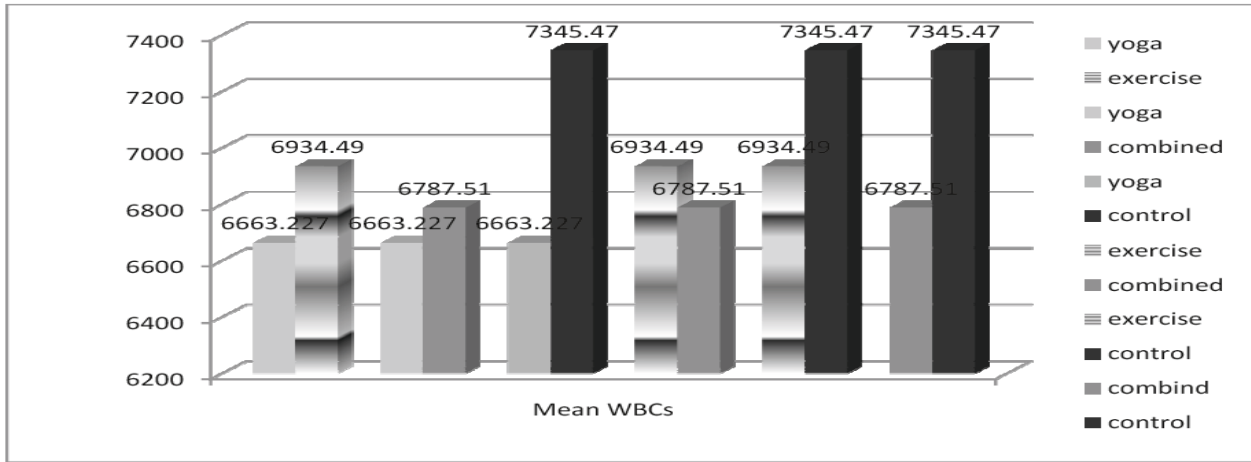
R.B.C and W.B.C. the critical difference for adjusted mean was applied to find out which of the differences between the paired adjusted final means were most significant. Differences between the paired adjusted final means are shown in table - 3.

**Fig: 1**  
**Post mean differences of RBCs after the experiment**



**Fig: 2**

**Post mean difference of WBCs after the experiment  
Table -3**



**Paired adjusted final means and differences between means for the three experimental groups and control group in Red, and White blood corpuscles.**

Variables	Mean				Difference	Critical Difference
	Yoga	Exercise	Combined	Control		
Red Blood corpuscles	3.9987	3.8009			0.197776*	0.112867
	3.9987		4.0450		0.044633	0.112867
	3.9987			3.2578	0.740912*	0.112867
		3.8009	4.0450		0.2441*	0.112867
		3.8009		3.2578	0.543136*	0.112867
			4.0450	3.2578	0.787226*	0.112867
White blood corpuscles	6663.227	6934.49			271.26	461.47
	6663.227		6787.51		124.28	461.47
	6663.227			7345.47	682.24*	461.47
		6934.49	6787.51		146.98	461.47
		6934.49		7345.47	410.98	461.47
			6787.51	7345.47	557.96*	461.47

**\*Significant at 0.05 level**

The above table reveals that in the case of R.B.C the difference in the means of all the above groups were significant except in the case of yoga and combined groups where the difference in the means was not significant at 0.05 level of confidence in the red blood cells. In case of W.B.C the difference in the means of yoga and control groups, combined and control groups, were significant but the other remaining groups where the differences in the means were not

found significant at 0.05 level of confidence in the white blood cells.

**DISCUSSION AND CONCLUSION**

The analysis of data clearly reveals that all experimental groups obtained significant improvement in R.B.C. the mean gain achieved by combined groups was higher than other groups. It is because of Combined group (yoga and exercise) an apparent increase in the concentration of red blood corpuscles is observed which is due to the mobilization of plasma from blood to

tissue fluid. Besides this the yogic asana, pranayama and exercise makes a greater amount for oxygen supply thus putting in to circulation the red blood corpuscles stored in spleen and accessory spleen. Asana and exercise also increase the myoglobin pigment (store keeper of oxygen), which is helpful to supply more amount of oxygen.

The reason for obtaining a significant change in the concentration of red blood corpuscles a result of general cardio fitness in the experimental group might have resulted in release of more amount of fluid from the blood vessels leading a significant increase in red blood corpuscles concentration in every session of training. As it is general belief that red blood is increased by yogic practices. The present investigation also supports these earlier findings by Morehouse and miller, (Physiology of exercise) p.180. Krebs et all (1983), and Uppal 1986, Sajwan 1988. The analysis of data clearly reveals that In case of W.B.C the difference in the means of yoga and control groups, were most significant then others it because of Yogic asana and pranayama minimize the stress of body, whether it is physical, physiological or psychological.

Practicing any yoga posture in a relaxing way with slow deep breathing and the intention to let go and relax the nervous system can be very beneficial in decreasing the symptoms of stress, allergies. Kapalabhati breathing is great for allergies as it forces out the mucus. (Don't forget to keep tissues within easy reach. The relaxation time at the end of a yoga class can also be an important part of decreasing allergic immune response. Relaxing the nervous system has been shown to help direct the immune system to attack the viruses and bacteria, but a strong immune system can frost the invaders within a few days, preventing more extreme manifestations of the illness and in fact

strengthening the immune system. Again, yoga postures done in a relaxed way and slow, deep pranayama can help relax the nervous system and boost the immune response. Located in the chest, the thymus gland is the locus of the immune system. Thus both the thymus gland and the immune system are stimulated by any posture in which we open the chest and breathe deeply into it.

The most beneficial postures for this purpose are the Cobra, the Fish, the Boat, the Bow and the Bridge. Since the thymus gland corresponds to the fourth chakra, these postures can be enhanced by including chakra sounds such as the fourth chakra bij mantra "yum" or the fourth chakra vowel sound "ay." Kapalabhati breathing or slow deep ujjayi breathing in postures where the chest is open can also be beneficial. With a relaxed nervous system and a focused and revitalized immune system, (Jeff Migdow, M.D., 2004) Yogic asana and pranayama minimize the all types stress of body, and leucocytes count increase only when there is any type of stress or allergies. So by this effect of yogic asana and pranayama the total count of leucocytes might be decrease, with this the neutrophiles (a part of leucocytes) become increase by a biochemical reaction in side of body. The main function of eutrophiles is phagocytosis and production of antibodies, by which the immune system become strong. This in consequence, might have increased the leucocytes.

The present investigation also supports these earlier findings by winter 1985; king roy 1999, shridharan, k, et al, 1981, majmudar, 2000. malathi 2001. It revealed on the basis of analysis of data that there was no significant change in case of platelets before and after the experimental period. Reason may be that 12 weeks of training period might not have been

sufficient to bring out significant change on this variable.

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