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## Effect of yogic training on selected hematological variables among college students

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### Abstract

According to medical scientists, yoga therapy is successful because of the balance created in the nervous and endocrine systems which directly influences all the other systems and organs of the body. Yoga acts both as a “Curative therapy”. The very essence of yoga lies in attaining mental peace, improved concentration powers, a relaxed state of living and harmony in relationship. Regular practice of asana, Pranayama and meditation can help such diverse ailments such as diabetes, blood pressure, digestive disorders, arthritis, arteriosclerosis, chronic fatigue, asthma, varicose veins, and heart conditions.

**Objectives:** The purpose of this investigation was to study the effects of Yogic training on selected hematological variables among college students.

**Methods:** Post-test (After the Yogic training of 12 weeks) design was used study group (N = 30 in which 15 subjects were act as control group and 15 subjects were act as experimental group) allowed to undergo Yogic training. The selected Hematological variables that are Hemoglobin (HB), White Blood Cells, Red Blood Cells and Platelets were examined by laboratory test. For the analysis of data paired ‘t’ test was applied.

**Findings:** There was insignificant reduction of white blood cells in study group i.e. post-test value (8.66 x 10<sup>9</sup>/L)], but the numbers of red blood cells, Platelets and Hemoglobin (in grams) have significantly improved in experimental group after yogic training ( $P < 0.05$ ). The selected hypothesis has accepted.

**Keywords:** Hematology, hemoglobin, red blood cell, white blood cells, platelets

### Introduction

The zeal for winning medals in the prominent international competitions has motivated the Physical educationist and Sports experts are supposed to take idea to explore all the aspects and potential which can be supportive to improve sports performance. The standard of Sports performance has risen to a zenith with the help taken from various sports sciences such as sports physiology, sports medicine, biomechanics, sports psychology and sports training etc. The coaches, physical fitness experts and athletes are focusing their attention on the actual process of physical training and the physiological adaptations which allow the athlete to improve his general and specific physical fitness for the enhancement of athletic ability and performance for competitive situation. The researches and sports scientist have taken enough pains to know the effect of physical training on specific components of physical fitness. Numerous techniques of sports training are used to develop sports performance. The sports scientists and Physical educationist have now started looking further than these horizons and Yogic training are also implemented at the present time to improve the performance of sports person's. Yoga is the science of appropriate existent and, as such is affianced to be fused in daily life. It works on all facts of the person's physical, vital, mental, emotional, psychic and spiritual level.

In the epoch of current civilization, the wallop of industrialization technology can be envisioned on every facet of human life. This fast changing synopsis has changed every individual into a working machine as his addiction on motorized machine is developing with the passage of each day. The main reason behind this is because he always has urge to earn more and more money to deluge earlier of others and to get more sickness for himself and his family. So, consequently, he is always leading a life of enough tension and undesirable pressures. Money has become the main rover of his life.

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It is all and sundry for himself, father, mother and children. In the quest of materialism he has abandoned all the social requirements, relations and even ethics and his own health. So consequently, he is unable to fixed surplus time even a smaller period of time to look after his health. Due to this situation he is more recumbent to all sorts of ailments due to lack of proper exercise, diet and rest. Longer duration and unscheduled working hours, unbalanced diet and less rest periods have turned him into a physically weaker, mentally unbalanced, emotionally debouched and socially antagonistic individual.

The word Yoga comes from the Sanskrit word Yuj which means 'to join' and the meaning of Yoga is 'unity or 'oneness'. This unity or joining is depicted in devotional terms as the abutment of the diacritic recognition with the cosmic awareness.

India has affluent ritual of Yogic customs. Now-a-days Yoga, the antiquated method of postures, breathing and meditation is gaining a lot of attention from healthcare experts. With increasing scientific research in Yoga, their remedy demeanors are also being scrutinized. Asana and Pranayama have been assimilated apace with Ayurvedic medicine as the substructure of a classification of medical remedy. The pragmatic testament procured over the last certain decagons pillars the Yoga related assets for physical, mental and emotional health. People suffer from diabetes, blood pressure and asthma that associated in Yoga customs for 12 weeks incomparably amended problems. There is also proof that Yoga customs amend anatomical, physiological and psychological functions. Further, a stray tentative manifested that a 12-week programme of Yoga practiced for at least one hour daily was helpful to improve the hematological and respiratory functions.

These studies have mainly investigated the effects of Yoga training on the respiratory and cardiovascular systems make adjustments in response to both the intensity and duration. During Yogic training heart pump the more blood to the lungs. Thus cardiac output rises, the rate of blood flow through the lungs also increases. If blood flows through the lungs twice as fast as at rest, it picks up more amount of oxygen as per minute. In addition, the rate at which oxygen diffuses from alveolar air into the blood increases during maximal exercise because blood flows through a larger percentage of the pulmonary capillaries, providing a greater surface area for diffusion oxygen into the blood. When muscles contract during the exercise, they consume larger amount of oxygen and produce large amount of carbon di oxide forcing the respiratory system to work harder to maintain normal blood level. During Yogic training, oxygen consumption and ventilation increases dramatically. At the end of the Yogic training, an abrupt decrease in ventilation rate is followed by a more gradual decline to the resting level. The initial decrease is due to mainly the decrease of stimulation of prop receptors when movement stops or slows. The more gradual decrease reflects the slower return of blood chemistry and blood temperature to resting levels.

There are many extensions of Yoga: Raja Yoga, Hatha Yoga, Jnana Yoga, Karma Yoga, Bhakti Yoga, Mantra Yoga, Kundalini Yoga and Laya Yoga to name but a few, and many extracts annotate them in particulars. There are many facets to Yoga. Yoga has been practiced for thousands of years. It is based on obsolete assumptions and regulations of the mind body associations. Consequential research has been regulated to look at the health of Yoga – Yoga postures (*Asanas*), Yoga breathing (*Pranayama*), Bandha (locks), Shatkarma (Kriya

and Meditation.

Hematology is the study of diseases, treatment and prevention related to the blood. Blood contains predominantly three types of blood cells including red blood cells (RBC), white blood cells (WBC) and Platelets. Red blood cells are concerned with transport of oxygen to various tissues, white blood cells are basically defense system of body which helps fighting infections and platelets are the backbone of clotting system. In addition to this blood contains variety of proteins, most important of which are clotting factors, which in addition to platelets are must for clotting of blood. Human performance in various sports depends on the availability of oxygen to the working muscles, and thus on the ability of the blood to transport oxygen, a function of RBCs. Hence blood oxygen content is most important parameters of hematology which concerns a sportsperson. Oxygen is transported in the blood in two forms; bound to hemoglobin and dissolved in plasma and two of these; it is the oxygen bound to hemoglobin is the most important contributor to blood oxygen content.

When there is halt in exercise many physiological alterations occur. There is bereaving in the cardiovascular accretions made markedly noticed. Cardiovascular endurance capacity lost very rapidly. One begin to bereave the cardiovascular accretions one made markedly one's hearts capability to pump blood more accurately, one's muscles mended amplitude to course oxygen and bodies strengthen capability to use crabs for fuel. Training cajoled advancements in blood pressure, blood cholesterol, and blood sugar levels begins to perish. And when one halt strength training, one slowly bereave the yields made in muscle fiber size and other neuromuscular training modifications.

There is an astonishing dearth of research in this distinct area. This induced us to commence this study with the objective to appraise the effect of Yogic training on Hematological variables among college students.

### **Statement of the problem**

The problem is stated as, "Effect of Yogic Training on Selected Hematological Variables among College Students".

### **Objectives of the study**

To study and compare the effect of Yogic training on Hematological variables of students of control and experimental group.

### **Hypotheses of the study**

There would be a significant difference in haematological variables i.e

Hemoglobin, RBC, WBC and Platelets cells of students of control and experimental group after 12 weeks of yogic training.

### **Limitations of the study**

1. The subjects performed different activities in the daily routine, which could not be checked and considered as the limitation of the study.
2. External influences affecting subject's perceptions and physical activity level cannot be controlled with in the control group.
3. Since no motivational technique was used, the subjects might have not taken up practice seriously.

### **Delimitations of the study**

1. The study was delimited to the Students of Government College Nagrota Bagwan (HP).

2. The study was delimited to the subjects aged between 20-25 years.
3. The study was delimited to (N=30), thirty male Subjects. (15 control and 15 Experimental subjects).
4. The study was further delimited to selected hematological variables i.e WBC, RBC., Hemoglobin and Platelets.

**Definition and explanation of the terms used**

**Hematology**

Hematology is the study of blood. Blood is a liquid connective tissue that consists of cells surrounded by extracellular matrix. Blood is the vital body fluid that is continuously circulating in the vascular system and forms a most efficient transport system of the body. Blood is essential to life, and has several functions.

**Haemoglobin**

Hemoglobin is a complex protein present in the blood cell which gives the red color to the blood. Hemoglobin is rich in Iron. The amount of hemoglobin in normal blood is about 15 gm/100 ml blood and this ammunition is called “100 per cent”. It is conjugated protein.

**Red Blood Cells**

Red blood cells, erythrocytes, are relatively large microscopic cells without nuclei and make up about half of the total blood volume. The red blood cells are normally biconcave discs having a mean diameter of about 7.8 micrometers and a thickness of 2.5 micrometers. The major function of the red blood cells is to transport hemoglobin, which in turn carries oxygen from the lungs to the tissues.

**White Blood Cells**

White blood cells also called leukocytes are, the mobile units of the body’s protective system. They are formed partially in the bone marrow and partially in the lymph tissue. After the formation they are transported in the blood to the different parts of the body where they are needed.

**Platelets**

Platelets or thrombocytes are small a nuclear bodies that stop bleeding and aid in the process of blood coagulation. It is another type of element present in the blood. Platelets are

disc-shaped, have a diameter of 2-4 μm, and exhibit many vesicles but no nucleus.

**Design of the study**

It was control group experimental design of study “The effects of yogic training on hematological variables among college students”.

**Selection of Subjects**

To achieve the objectives of the study, 30 students in the age group of 20-25 were randomly selected from Government College Nagrota Bagwan (HP) to act as subjects for the study. The subjects were further divided randomly into equal number of groups acting as control and experimental group.

- **Group-A: (A=15)**
  - Experimental Group=15
- **Group-B: (B=15)**
  - Control Group=15

**Selection of Variables**

1. Hemoglobin gm/dl
2. Red blood cells m/mm3
3. White blood cells cells/cumm
4. Platelets cells/comm.

**Selection of test/tools**

Elite Clinical laboratory, sterilized with needle, cotton, Spirit stopper, test tube rubber bung and drabkin’s solution, Potassium ferricyanide, Hb pipette, distilled water, photoelectric calorimeter was used.

**Yogic practices training module**

The yogic practices training module prepared by qualified Yoga trainer Mukesh Sharma (PG Diploma in Yoga & Meditation). The yogic practices training programme was given to experimental group for 12 weeks. One session in the morning between 6.00 A.M. to 7.00 A.M for five days a week i.e. from Monday to Friday was conducted.

**Results and Discussion**

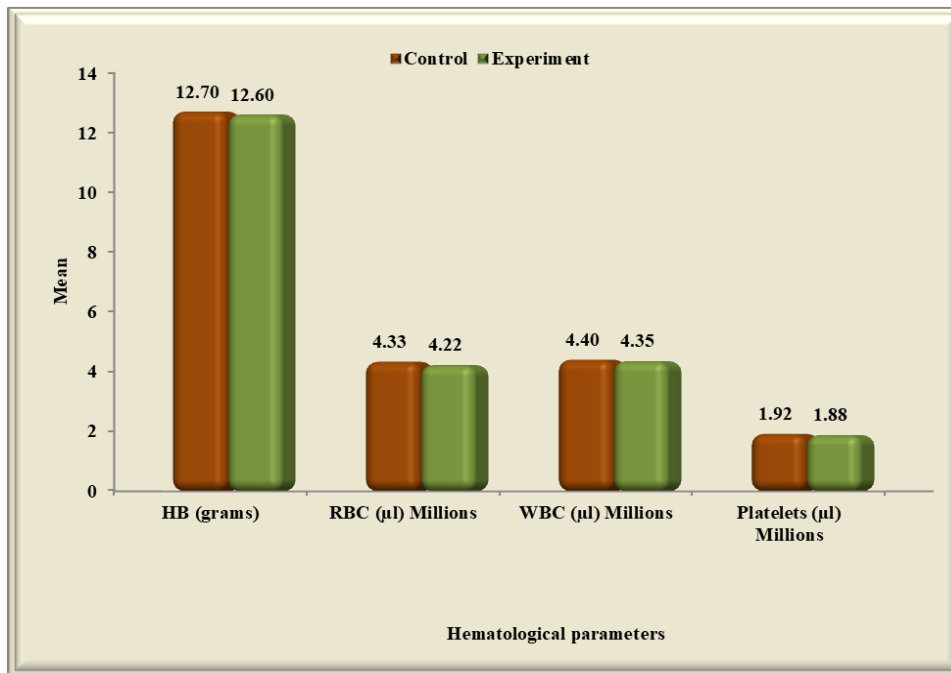
**Section A: Hematological Variables at time of enrollment (Pre-test)**

**Table 1:** Mean Comparison of Hematological Variables among Students in both groups at time of Enrollment (Pre-test)

Parameters	Control			Experiment			t-value	p-value
	N	Mean	SD	N	Mean	SD		
HB (grams)	15	12.7	0.7	15	12.6	0.5	0.299	0.768 <sup>NS</sup>
RBC (μl) Million	15	4.33	0.2	15	4.22	0.2	1.489	0.148 <sup>NS</sup>
WBC (μl) Million	15	4.40	0.2	15	4.35	0.3	0.431	0.669 <sup>NS</sup>
Platelets (μl) Million	15	1.92	0.2	15	1.88	0.1	0.575	0.570 <sup>NS</sup>

Independent sample t-test values depicted in Table 1, proves that both groups were having identical mean values for all Hematological variables at enrollment (Pre-test). The non-

significant p-value of HB, RBC, WBC and platelet count shows both groups were same at the time of enrollment (Pre-test) in terms of hematological parameter measurements.



**Fig 1:** Mean Comparison of Hematological Variables among students in both groups at Enrollment (Pre-test)

The above Figure 1, shows the mean Hematological variables in students from both groups. The almost similar mean value in all four parameters signifies that groups are similar on the basis of these parameters.

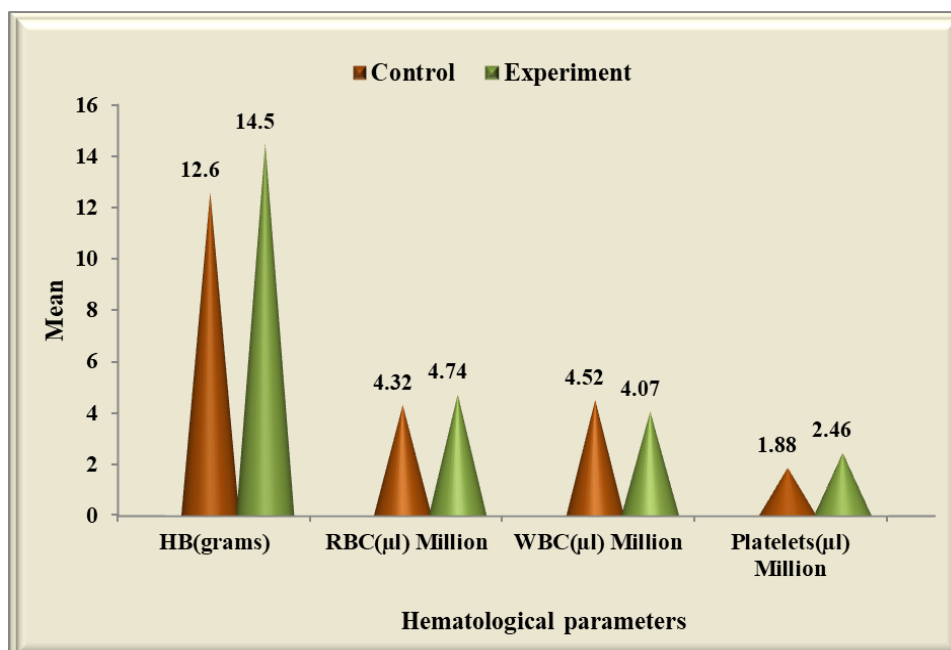
**Hematological variables after the 12 weeks from Enrollment (Post-test)**

**Table 2:** Mean Comparison of Hematological Variables among students in both groups after 12 weeks (post-test)

Parameters	Control			Experiment			t-value	p-value
	N	Mean	SD	N	Mean	SD		
HB (grams)	15	12.6	0.5	15	14.5	0.3	11.617	0.000*
RBC(µl) Million	15	4.32	0.2	15	4.74	0.2	5.510	0.000*
WBC(µl) Million	15	4.52	0.2	15	4.07	0.1	8.448	0.000*
Platelets(µl) Million	15	1.88	0.1	15	2.46	0.6	3.930	0.001*

Table 2, shows that the change in the hematological parameters after 12 weeks witnessed significant mean difference between both groups. Experimental group showed statistically higher values ( $p < 0.001$ ) in HB, RBC and Platelet

counts compared to control group according to independent sample t-test. Only WBC counts were significantly higher in controls. Thus it can be concluded that yogic exercises affect hematological parameters of students.



**Fig 2:** Mean Comparison of Hematological Variables after 12 weeks (post-test)

The mean change in Hematological parameters after 12 weeks among students from controls and experimental group has been depicted in Figure 4. HB (grams) of experimental group 14.5 rose fairly high compared to 12.6 in control. Even average RBC count (4.74) of experiment group was more than 4.32 in control group. The mean WBC counts were more 4.52 in control group contrary to 4.07 in experimental group. Marked increase in experimental group was observed with average 2.46 million platelet counts over 1.88 in control group.

### **Findings and Conclusion**

In the table-1 pre-test of control and experimental group in the hematological variables there has been insignificant difference among in all the parameters.

In the table-2 after the yogic training of 12 weeks of experimental group, both groups are compared and found that there is significant difference found in HB, RBC and Platelets. The research shows that in the post-test after the yogic training of 12 weeks HB, RBC and Platelets of experimental group rise fairly high as compare to control group, whereas WBC counted more in control group contrary to experimental group. Hence the hypothesis stands accepted.

### **Recommendations for the further research**

1. The similar study should be conducted on female subjects.
2. The similar study should be conducted on the subjects of different age groups.
3. The similar study should be conducted on the biochemical variables

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