HEMATOLOGICAL MODULATION IN REGULAR PRACTICE OF YOGA IN YOUNG HEALTHY MEDICAL STUDENTS.

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ABSTRACT

**Background:** Good health and freedom from disease is the best achievement of life. For thousands of years, yoga an ancient holistic relaxation practice has been used as an effective therapeutic tool that counteracts the adverse clinical conditions of human beings. Yoga has been reported to be beneficial in treating stress related disorders, improving autonomic functions, lower blood pressure, obesity, anxiety, insomnia, psychosomatic disorders, increase strength and flexibility of muscles, improve the sense of well being, slowed ageing process, control breathing, reducing signs of oxidative stress & improving spiritual growth. **Objective:** The aim of present study was to investigate whether regular practice of Yoga for three months can improve hematological parameters in anemia.

**Material and Method:** The study group, comprised 90 medical students aged between 18 - 25 years. They were trained for 3 months of Yoga. Assessments of various parameters were done before and after Yoga practices, were significantly modulated, statistically by using student’s test. **Result:** Regular practice of yoga for 3 months significantly improved the R.B.C., W.B.C., Platelet count and Hb content (P-.000). **Conclusion:** We concluded that regular practice of yoga for promotes trafficking of the stem cells from bone marrow and improve hematological parameters in anemia.

**KEYWORDS:** Yoga, hematological parameters.

INTRODUCTION

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 practitioners 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.\[2\]

Yoga is a practice of mental and physical exercise techniques, aiming to acquire good health in human beings. Holistic health, integrative treatment and mind, body medicine are some of the current buzz words in health care originated actually from yoga, which took its birth some 6000 years ago in India and is one of the elements of ayurvedic medicine as the healing science.\[3\] Yoga science is emerged as contemplation and also communion and yoking all powers of the body, mind, and soul to God. Yoga practices are gaining popularity and have the potential to make a significant contribution to the field of health sciences. Having a wide array of practice, all essentially including breathing exercises, physical postures and meditation, the science, and art of yoga is reaching new heights, associated with a series of behavioral modifications that contribute to a healthy lifestyle, traditional yoga is a philosophy for living.\[4\] The practice improves mood and reduces stress utilizing mind/body strategies designed to promote good health that covers relaxation techniques, hypnosis, visualization, feedback, Qigong, Tai Chi, meditation, autogenic, cognitive behavioral therapy, group therapy, and spirituality. All these strategies are based on research conducted to establish if there is a link between the nervous, immune, and endocrine systems.\[5\] Recently, scientists have explored its consistent beneficial biochemical, physiological, psychological effects in human beings. Yoga based training normalizes the functions of the autonomic nervous system by maintaining both sympathetic and parasympathetic indices toward normal. It is found that yoga has an immediate effect on the HPA axis (hypothalamic - pituitary axis) response to stress.\[6\] Though precise mechanism has not yet been established. Its being hypothesized that some yoga exercises via vagus stimulation, lead to a shift toward parasympathetic nervous system predominance. A significant effect of yoga has been noticed in decreasing the blood glucose level, the heart rate, and systolic and diastolic blood pressure.\[7\], studies on hematological and biochemical modulation in regular yoga practitioners need extensive research exposure to recommend the use of yoga as a complementary therapy

On entering into the professional college the student is in a new challenging and stressful environment. Factors contributing to high levels of stresses in professional colleges could be
highly competitive curriculum, intense academic competition, and excessive demands on coping abilities in physical, emotional, intellectual, financial and social terms. Possibly these and many more factors contribute to high levels of stress in medical students. With the above facts in mind the relevance of yoga in medical education was evaluated.\textsuperscript{[8]}

Academic examination stresses were reported to have a significant impact on the student’s well-being\textsuperscript{[9]} and are associated with changes in the mental and physical health such as increasing anxiety, increasing negative mood and changes in the immune functioning.\textsuperscript{[10]} Academic stress, the stressful condition of students taking examination, can be considered as a good model of naturalistic stress in human beings as compared with laboratory-induced stress situations.\textsuperscript{[9]}

In the ancient system of education various yogic practices like Suryanamaskar, Pranayama, meditation as well as good value systems were introduced with the formal education to enable the development of good physique, strong ethical values and good stress tolerance.\textsuperscript{[11]} A state of mental tranquility is achieved by the practice of yoga as revealed by increase in alpha index of electroencephalogram after short term yoga.\textsuperscript{[11,12]} Yoga can protect the individual by bringing harmony between mind and body, modulating stress responses and one's attitude to stress as also improving mental faculties such as attention, memory, learning efficiency and positive attitude to life.\textsuperscript{[13,14,15]} Total growth of personality at physical, mental, intellectual and social level can result with the regular practice of yoga.\textsuperscript{[16]} At physical level regular practice of asana, pranayama bestows a proportionate, flexible, normally relaxed body with an ability to withstand stress efficiently. Yoga is the best lifestyle modification, which aims to attain the unity of mind, body and spirit through asana (exercise), pranayama (breathing), and meditation.\textsuperscript{[17]} At critical times necessary energy gets evoked to deal with the stressful state.\textsuperscript{[8]} At intellectual level, yoga can sharpen memory, concentration, decrease anxiety levels.\textsuperscript{[16, 17]} At spiritual level yoga creates an awareness to look for happiness from within oneself and to be at peace with oneself. The study was carried out in Young healthy medical students, to study the effect of yoga practices on hematological parameters such as R.B.C Count, WBC Count, Platelet Count and hemoglobin estimation by activation of Bone marrow and certain hormonal release to bring the hematological parameters normal.

**MATERIAL AND METHOD**

The study was carried out on ninety first-year MBBS student volunteers staying in hostel campus. Study group comprised 45 male and 45 female healthy subjects of 18-20 years.
Hematological parameters like total RBC Count, total W.B.C Count, hemoglobin content/dl and total Platelet count were determined by Improved Version of automated hematology auto-analyzer Swelab alfa Sweden. For this Hemogram study, 3 ml of blood was collected in EDTA Vial under aseptic precautions.

Study group underwent yoga practices for 60 minutes twice a day in the presence of a trained yoga teacher for 12 weeks. The first observation of the study group was taken before start yoga practice. Second observation was carried out after 3 month of yoga practice from the start of study. The study protocol was explained to the subjects and written consent obtained. Approval by ethical committee of S.S. Medical College, Rewa, M. P., was obtained. All the volunteers were clinically examined to rule out any systemic diseases. All subjects were non-alcoholic and non-smokers. They were not taking any drugs, and they had similar dietary habits as well as physical and mental activities at work and home. They were not practicing any known stress relieving or relaxation technique previously.

All the 90 volunteers of study group were trained under the guidance of a certified —yogal teacher for 15 days in the Deptt. of Physiology. They carried out —Yogasanas, Pranayama and Meditationl 60 minutes, twice a day, in morning and evening for three months, under supervision, in a prescribed manner. The schedule consisted of.

- Yogasanas- -10 minutes.
- Pranayama- -10 minutes.
- Meditation- -40 minutes.

- **The asanas practiced were:** Ardhachakrasana, Tadasana, Paschimottasana, Utthita Trikonasana, Vajrasana, Salamba Sarvangasana and Halasana.

- **The Pranayama performed was:** Anulom –vilom
  - The volunteers practiced these exercises early in the morning and in evening, in a quiet, well ventilated room or in open air space sitting in a comfortable posture.

The Meditation performed was: the same, as was told by Lord Krishna to Arjun in Kuruchhetra (Method is available in Bhagvat Geeta. 9th to 16 slokes of Dhana Yoga chapter).
Collection of blood sample for hematological parameters.
All of the subjects of study groups were asked to report at 9 am. Taking all aseptic precautions, 3 ml venous blood sample was drawn from the antecubital vein of each subject at first, before start yoga practice. Second blood sample was taken after 3 month of yoga practice from the start of study.

STATISTICS
The data was analyzed statistically by using statistical software Graph Pad in Stat vs. 3.10 and MS Excell (2003). Statistical analysis of total RBC Count, total W.B.C Count, hemoglobin content/dl and total Platelet count, were done using student’s test and p < 0.01 was considered as significant.

RESULTS
In female study group (Table No. 1), results showed that the values of all hematological parameters were modulated after 3 month of yoga practice as compared to basal readings, were more significantly changed (p < 0.000).

In male study group (Table No. 2), results showed that the values of all hematological parameters were modulated after 3 month of yoga practice as compared to basal readings, were more significantly changed (p < 0.000).

The effect of 03 months of yoga in female study group
The Total RBC Count/ c.mm increased from mean value 3.449 ± 0.131 to 4.32 ± .0795 (p <0.000) statistically more significant & was due to the effects of regular practices of yoga.

The Total WBC Count/ c.mm decreased from mean value 7321± 214.9 to 6680 ± 142.4 (p <0.000) statistically more significant & was due to the effects of regular practices of yoga.

The HB content gm / dl increased from mean value 8.67 ± 0.429 to 9.93±0.363 (p <0.000) statistically more significant & was due to the effects of regular practices of yoga.

Total Platelet Count in lacs / c.m.m. increased from mean value 1.86 ± 0.034 to 2.01 ± 0.112 (p <0.000) statistically more significant & was due to the effects of regular practices of yoga.
The effect of 03 months of yoga in male study group

The Total RBC Count/ c.mm increased from mean value 4.59 ± 0.112 to 4.975 ± 0.0324 (p <0.000) statistically more significant & was due to the effects regular practices of yoga.

The Total WBC Count/ c.mm decreased from mean value 8677 ± 35.44 to 7486 ± 55.32 (p <0.000) statistically more significant & was due to the effects of regular practices of yoga.

The HB content gm / dl increased from mean value 9.46 ± 0.237 to 10.8 ± 0.357 (p <0.000) statistically more significant & was due to the effects of regular practices of yoga.

Total Platelet Count in lacs / c.m.m. increased from mean value 1.86 ± 0.279 to 2.028 ± 0.757 (p <0.000) statistically more significant & was due to the effects of regular practices of yoga.

Table (01): showing changes in Total RBC Count/ c.mm, Total WBC Count/ c.mm, HB content/ dl and Total Platelet Count/ c.mm before and after three months of yoga practices in Females.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameters</th>
<th>Before yoga.</th>
<th>After three months of yoga.</th>
<th>P Value</th>
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<tr>
<td></td>
<td></td>
<td>Mean Value S. D.</td>
<td>Mean Value S. D.</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Total RBC Count/ c.mm</td>
<td>3.449± 0.131</td>
<td>4.32 ± 0.0795</td>
<td>p&lt;0.000</td>
</tr>
<tr>
<td>2</td>
<td>Total WBC Count/ c.mm</td>
<td>7321± 214.9</td>
<td>6680 ± 142.4</td>
<td>p&lt;0.000</td>
</tr>
<tr>
<td>3</td>
<td>HB content gm / dl</td>
<td>8.67 ± 0.429</td>
<td>9.93 ± 0.363</td>
<td>p&lt;0.000</td>
</tr>
<tr>
<td>4</td>
<td>Total Platelet Count lacs / c.mm</td>
<td>1.86 ± 0.034</td>
<td>2.01 ± 0.112</td>
<td>p&lt;0.000</td>
</tr>
</tbody>
</table>

Table (02): showing changes in Total RBC Count/ c.mm, Total WBC Count/ c.mm, HB content/ dl and Total Platelet Count/ c.mm before and after three months of yoga practices in males.

<table>
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<td>Mean Value S. D.</td>
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<td>1</td>
<td>Total RBC Count/ c.mm</td>
<td>4.59± 0.112</td>
<td>4.975 ± 0.0324</td>
<td>p&lt;0.000</td>
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<td>2</td>
<td>Total WBC Count/ c.mm</td>
<td>8677± 35.44</td>
<td>7486 ± 55.32</td>
<td>p&lt;0.000</td>
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<tr>
<td>3</td>
<td>HB content gm / dl</td>
<td>9.46 ± 0.237</td>
<td>10.8 ± 0.357</td>
<td>p&lt;0.000</td>
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<tr>
<td>4</td>
<td>Total Platelet Count lacs / c.mm</td>
<td>1.86 ± 0.279</td>
<td>2.028 ± 0.757</td>
<td>p&lt;0.000</td>
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showing effect of Yoga on total RBC count/cmm bld in female & male subjects

<table>
<thead>
<tr>
<th></th>
<th>Before yoga</th>
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<tr>
<td>Total RBC</td>
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<tr>
<td>Count/c.mm in female</td>
<td>3.449</td>
<td>4.32</td>
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<tr>
<td>Total RBC</td>
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<tr>
<td>Count/c.mm in male</td>
<td>4.59</td>
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showing effect of Yoga on total WBC count /cmm bld in female & male subjects

<table>
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<td>Count/c.mm</td>
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<td>7321</td>
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<tr>
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<td>7486</td>
<td>8677</td>
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showing the effect of yoga on HB content in female & male subjects

<table>
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<th>HB content g/dl</th>
<th>BEFORE YOGA</th>
<th>AFTER YOGA</th>
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<tbody>
<tr>
<td>g/dl</td>
<td></td>
<td></td>
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<tr>
<td>8.67</td>
<td>9.93</td>
<td>10.8</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>9.46</td>
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</table>
DISCUSSION
On analyzing the effect of yoga on hematological parameters in normal healthy subjects of first-year MBBS student age group 18-20 years, in our study, total RBC Count, total W.B.C Count, hemoglobin content/dl  and total Platelet count were studied in study group before yoga and after three months of yoga (Asana, Pranayama and Meditation).

The study group volunteers showed the effect of yoga on total RBC Count was increased (<0.000), whereas total WBC Count was decreased (<0.000), hemoglobin content/dl was increased (<0.000), and total Platelet count was also increased (<0.000) and all these parameters were modulated due to regular practices of yoga. 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. Yogic asanas and pranayamas minimize all types of stress of body. Leucocytes count increase only when there is stress and allergy but the effect of yogic asanas decreases total leucocytes count indicating anti-stress and allergy but the effect of yogic asana decreases total leukocyte count indicating anti-stress mechanisms of the body whether it is physical,
physiological or psychological. There was significant improvement in Hemoglobin, MCH, and MCHC content in subjects after 6 weeks training course.\textsuperscript{[19,20,21]} yoga asanas significantly increase hemoglobin (Hb) content\textsuperscript{[22,23,24]}, effect of Sudarshan Kriya yoga was also significantly increase hemoglobin content\textsuperscript{[25]}, it can be hypothesized that it is due to anti-stress and antioxidant effect of yoga. The effect of various yoga exercises on various hematological parameters such as platelet count, clotting time, and bleeding time reported that their platelet count and clotting time both were increased significantly.\textsuperscript{[26]} The effect of yoga on anemic patients was significantly increase hemoglobin content due to increased red blood cell count can be explained by two different mechanisms; it may be due to hypoxia that release more erythropoietin during yoga practices and second is that yoga practices increased release of iron stores from reticulo endothelial cells and splenic contraction enhance the release of reserved RBCs.\textsuperscript{[27]}

Asanas minimizes all types of stress whether it is physical, physiological or psychological as revealed by decreased leukocyte count after yoga\textsuperscript{[28]}, Decline in total WBC count may be due to the concept that hypoxia induced during yoga, increase erythroied series in bone marrow causes relative decrease in WBC count or Yoga may transited the WBC in their resting condition and decrease various cytokines which are responsible for leucopoiesis.\textsuperscript{[29]}, significant improvement of red blood cells count due to effect of yoga\textsuperscript{[30,31]}, cardioprotectant factor of yoga practice increase in hemoglobin may be justified by the anti-stress effect produced by parasympathetic dominance.\textsuperscript{[32,33]} Sudarshan kriya and pranayam significantly increased platelet count, packed cell volume suggested that stress-induced pro inflammatory cytokine production may stimulate the proliferation of hematopoietic cells.\textsuperscript{[34,35,36]} Yoga is being used increasingly in the medical field as a healing modality for adult patients experiencing serious illness involving alterations in the hematological profile of the patients including for those undergoing chemotherapy and radiation treatment for cancer.\textsuperscript{[37]} 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 a 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.\textsuperscript{[19]}
CONCLUSION
Non pharmacological methods like yogic asanas, pranayama, and meditation promotes trafficking of the stem cells from bone marrow for possible repair and regeneration of worn out and degeneration of tissues. It can thus be concluded that these results would justify the incorporation of yoga as part of our life style and essence of the life. is cheap and cost-effective discipline.

REFERENCES


