

# Consequences Of Spirulina Food Supplement On The Complete Blood Count Of Women Labourers Of Different Regions Of Prayagraj (U.P.).

<sup>1</sup>Shubham Verma\*, <sup>2</sup>S. P. Mishra, <sup>3</sup>B. K. Dwivedi, <sup>4</sup>Ravindra Singh and <sup>5</sup>I.P. Tripathi.

1 Research Scholar, Deptt. Of Biological Sciences, M.G.C.G.V., Chitrakoot, Satna (M.P.) India.

2 Associate Prof. & Head Deptt. Of Crop Sciences, M.G.C.G.V., Chitrakoot, Satna (M.P.) India.

3 Director, Bioved Research Institute of Agriculture Technology and Sciences, Prayagraj (U.P.) India.

4 Associate Prof. & Head, Deptt. of Biological Sciences, M.G.C.G.V., Chitrakoot, Satna (M.P.) India

5 Dean, Faculty of Science and Environment, M.G.C.G.V., Chitrakoot, Satna (M.P.) India

**Abstract:** Spirulina is microscopic blue green algae that contains diverse concentrations of nutrients and has emerged as a wonder medicine or food supplement. The Spirulina produced in the Research farm of Bioved Research Institute of Agriculture Technology and Sciences (Prayagraj). It is a most rationally balanced super food having the highest nutrient contents. In the present study 90 poorest, physically weak women labourers (aged 21 to 60 years) have been selected who were have a lot of physical workload and don't have sufficient diet due to less family income and large size of family. The women were supplemented with three Spirulina capsules of 250 mg per day for 12 months. The complete blood count tests of each women labourer have taken place after every three month with the help of a consultant pathologist. The results confirmed the positive impact of Spirulina food supplement on mostly all blood morphological parameters and on the health of women labourers also.

**Key words - Spirulina, complete blood count, food supplement.**

## I. INTRODUCTION

Heavy physical load and their intensity require strict demands on labourer women's nutrition. The diet of women must be well balanced and highly efficient because their body has to tolerate more loads but the labour class women can't afford a complete diet even they have to live in extreme conditions and sometimes they don't have sufficient resources for their daily needs. Due to lack of education and awareness and low economic condition of the family they can't even think about health, healthy food and balanced diets thus becomes malnourished. Thus keeping these conditions of women in mind the present study have been done in the favour of labourer women's health. As a solution for labourer women, Spirulina a microscopic Cyanobacterium have been cultured and produced in the farm of Bioved Research Institute of Agriculture Technology and Sciences (Prayagraj). Spirulina is a photosynthetic life form originated some 3.5 billion years ago, these blue green algae created our oxygen atmosphere so other life could evolve (FAO, 2008). The Cyanobacterium Spirulina is spiral shaped blue green alga that is found in lakes, freshwater bodies, in sea water and brackish water bodies. It is so named due to its coiled or spiral structure of its filaments. It flourish best at pH of 10-12 in an alkaline medium (Capelli and Cysewski, 2010). The super food Spirulina contain the highest content of protein (65-70%); all essential amino acids, essential fatty acids, minerals, vitamins, pigments(beta carotene, chlorophyll a, and phycocyanin ) and antioxidants Spirulina has very high nutritional value. (Demir and Tukul, 2010; Moorhead and Capell, 2011). According to the World Health Organization predicted that *Spirulina* will become one of the most important curative and prophylactic components of nutrition in the 21st century and recommended it also for children's nutrition (Hasler, 2002). Spirulina is found to enhance the haemopoietic system and stimulate the immune system by building both RBCs and WBCs and assist detoxification (Miller *et al.*, 1991 :Lisheng, 1991). The super food Spirulina is found to be a best balanced highly efficient food supplement that fulfils each and every demands of all systems of the organisms body (Hayashi *et al.*, 1994). The motive of the present study is to access the impact of multicomponent and nutraceutical food supplement Spirulina on the complete blood count of Labourer women.

## II. RESEARCH METHODOLOGY

### 2.1. Selection of women labourers as samples

In the present study 90 women labourers (age 21-60 years) have been selected from the three different regions of Prayagraj city (India) i.e districts of Ganga par region, districts of Yamuna par region and from districts of trans Ganga Yamuna region during the year 2017-2018.

### 2.2. Dosage of Spiulina as a food supplement

A control test or a pre Spirulina supplementation complete blood count test (CBC) of all of the selected 90 women labourers was done before starting the investigation. Then all the 90 participants were supplemented with three Spirulina capsules of 250 mg per day for 12 months.

### 2.3. Complete Blood Count test After Spirulina Supplementation

After each trimester a complete blood count test have been taken place that is after three months, after six months, after nine months and after twelve months of Spirulina supplementation. The blood has been collected in a sterile test tube containing EDTA by venipuncture process from venous blood. The general blood picture was analyzed with the help of automated Hematology Analyzer (KX-21 Sysmex Transasia), Hgb colorimeter and Immunofluorescence Flow Cytometry . During the study Haemoglobin (Hgb), Red Blood Corpuscles(RBCs), Mean Corpuscular Volume (MCV), Hematocrit (HCT), Red cell distribution width (RDW), Erythrocyte Sedimentation Rate (ESR), White Blood Cells (WBCs), Lymphocytes (LYM) and Monocytes (MON) were analyzed.

### 2.4. Statistical Analysis

The data obtained were then observed by different mathematical statistic methods like arithmetic mean, standard deviation, error. Student's t test and Anova tests were applied for the betterment of the analysis.

## III. RESULTS AND DISCUSSION

Blood morphology plays a very important role in the body because blood supports the strength of the body system and various organs by performing different activities, providing oxygen and nutrition to the organs and also protecting the body against infections by eliminating the byproducts and hormone regulation etc. In the control stage of the study it can be observed that mostly every indices were below or near the normal levels but after supplementation of Spirulina there is found very positive impact on the most of the indices of complete blood count (CBC) of the women labourer's. There is found a constant and significant increase in the haemoglobin level during the complete study. According to data there is an increase of 1.377 g/L in haemoglobin level after a period of twelve months. In the case of RBCs there is seen a little increase in the RBCs count at primary stages but after a long term use of Spirulina for about six to twelve months there is found a significant increase in the RBC count.[Fig.1] . The values of lymphocytes (LYM) and monocytes (MON) were observed to be smoothed from first to the final stage. (Table 1).

Table 1 Dynamics of women labourer's complete blood count picture over the experimental period

Indices	Hgb (gm/dl)	RBCs (mm <sup>3</sup> )	MCV (fl)	HCT (%)	RDW (%)	ESR mm/h	WBCs (mm <sup>3</sup> )	LYM (%)	MON (%)
<b>Physiological marks</b>	12-16 g/dl	4-4.8 mm <sup>3</sup>	79-93 fl.	36-48 %	8-12 %	0-20 mm/hr	4500-11000 mm <sup>3</sup>	20-40 %	2-8 %
<b>Base Line</b>	9.62	3.77	78.48	28.46	15.13	30.00	6949.00	21.86	1.65
<b>± SD</b>	0.951	0.41	7.43	4.87	2.48	8.76	817.401	4.86	0.77
<b>After 3 Months</b>	10.31	3.93	83.73	30.52	14.63	29.40	8195.56	26.48	1.64
<b>± SD</b>	0.800	0.30	6.09	4.86	1.84	4.95	757.72	2.59	0.79
<b>After 6 Months</b>	10.58	4.00	84.13	31.36	14.49	30.85	8312.22	28.16	1.75
<b>± SD</b>	0.784	0.37	5.86	4.94	1.88	5.42	740.12	3.84	0.72
<b>After 9 Months</b>	10.80	4.03	84.82	31.95	12.93	25.02	8248.56	27.57	1.79
<b>± SD</b>	0.566	0.18	5.49	4.68	1.78	4.32	651.19	3.73	0.72
<b>After 12 Months</b>	11.00	4.12	87.56	32.53	12.10	23.10	8418.00	28.39	1.79
<b>± SD</b>	0.557	0.28	5.56	4.73	1.20	3.16	710.69	2.53	0.74

Another important aspect of blood composition is Haematocrit (HCT) it was found to be increased from 28.46% at base line to 32.53% at the final stage. In the case of RDW there is found a constant decrease in the values from 15.13% to 12.11%. The initial mean value of Erythrocyte Sedimentation Rate (ESR) was observed to be 30.00 mm/hr which declined up to 23.10 mm/hr. Thus there is found a constant and significant decrease in the level of ESR that shows the arrest of infections and diseases (Figure 2). WBCs were observed to be increased significantly but on comparison with other stages there is found very significant difference from 6949 mm<sup>3</sup> to 8418 mm<sup>3</sup> in first and the final stages respectively. Analysis of MCV (Mean Corpuscular volume) in the first trimester was found to increase from 78.49 fl to 83.74 fl and it constantly increased in further stages and at the final stage i.e. after twelve months it becomes 87.56fl. Similar findings were also reported by earlier researchers (Milasius *et al.*, 2009) (Figure 3).

In comparison to other food sources Spirulina is observed to be very highly nutritious food supplement with a great diversity and higher nutrient concentrations. In the present investigation on the impact of Spirulina as a food supplement on the complete blood count of labour class women was observed and found very positive effects of Spirulina on the health of the women labourers.

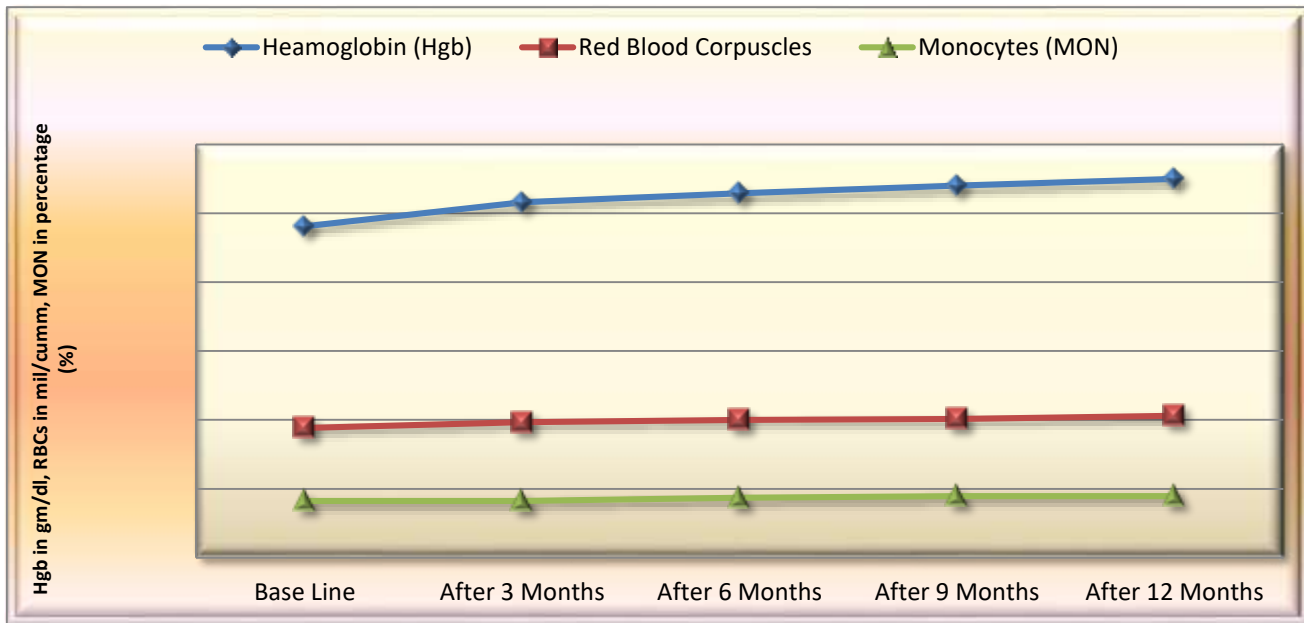


Figure 1: Showing the effects of Spirulina on different parameters before and after 3,6,9 and 12 months of Spirulina uptake

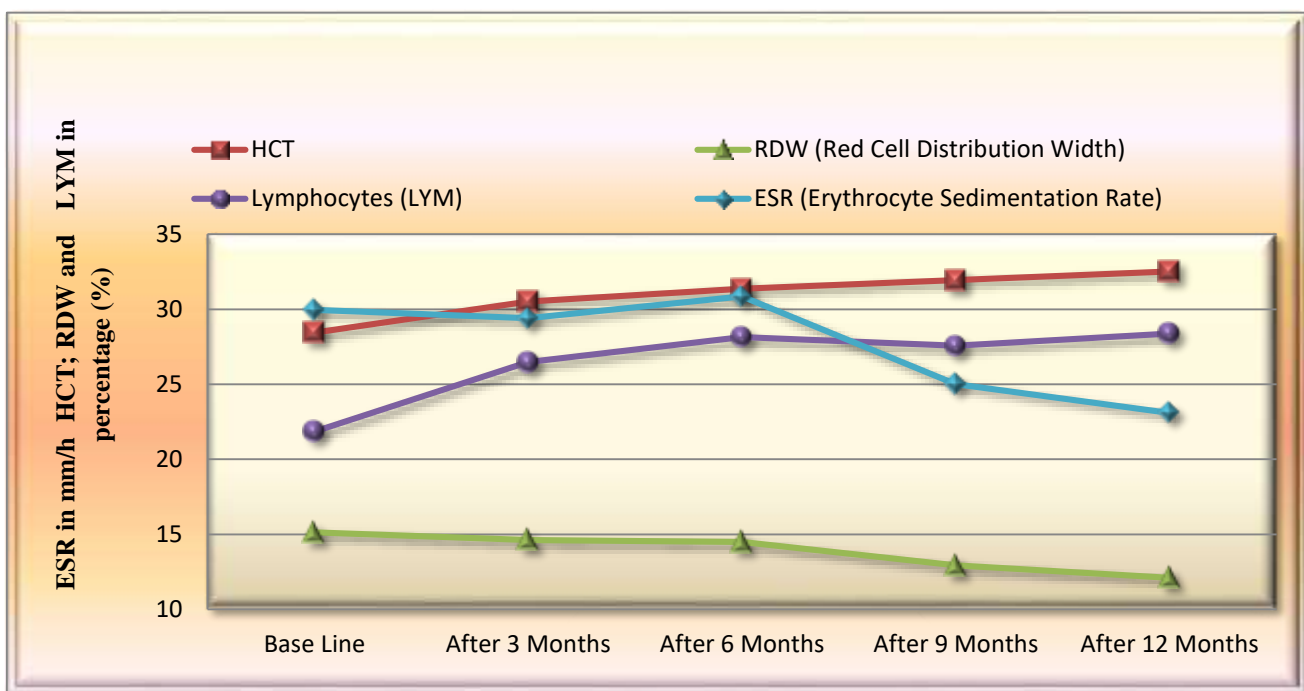
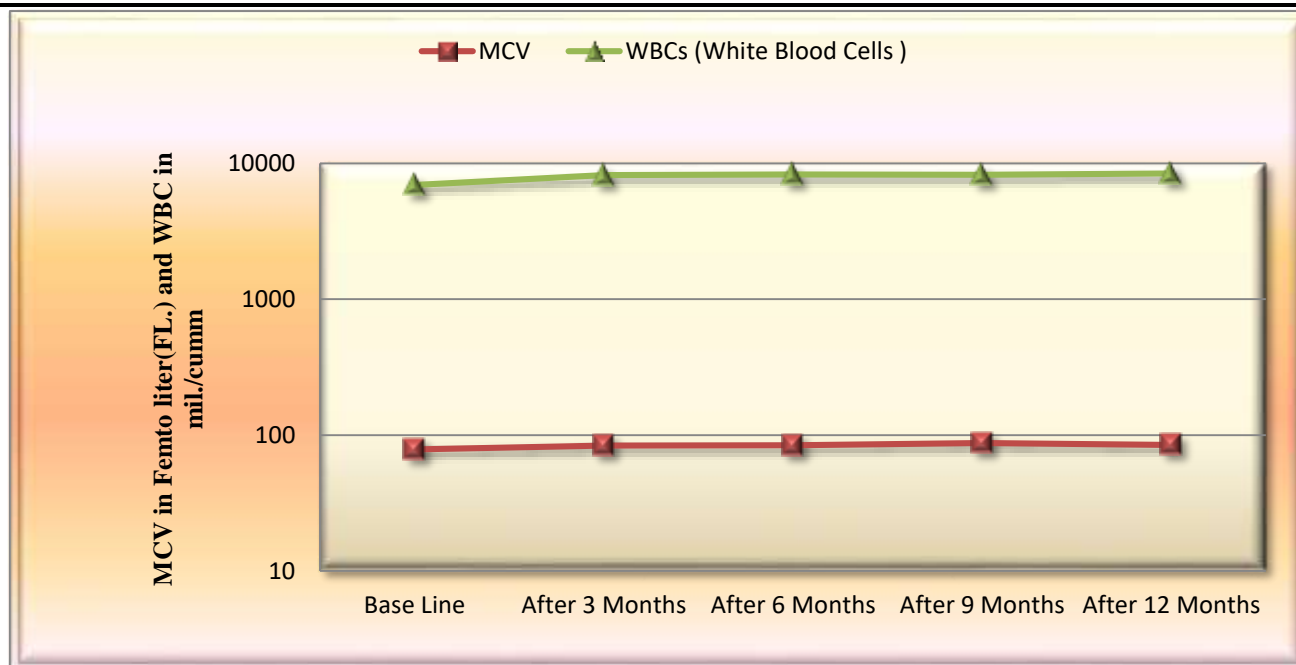


Figure 2: Showing the effects of Spirulina on different parameters before and after 3,6,9 and 12 months of Spirulina uptake



**Figure 3: Showing the effects of Spirulina on different complete blood count parameters before and after 3,6,9 and 12 months of Spirulina uptake .**

#### IV. CONCLUSION

Administration of three Spirulina capsules of 250 mg /day for 12 months as food supplement increased the level of Haemoglobin (Hgb), Red Blood Corpuscles (RBCs), Mean Erythrocyte Volume (MCV) and Hematocrit (HCT) with a decrease in Red Cell Distribution Width (RDW) and Erythrocyte Sedimentation Rate (ESR) values. Lymphocytes count (LYM) showed an increasing tendency while fewer changes were observed in the case of monocytes. Thus it can be concluded by the study that Spirulina exerts very positive impacts on the complete blood count of women labourers and their health as well.

#### V. REFERENCES

- [1] Capelli, B. and Cysewski, G.R. (2010). Potential Health Benefits of *Spirulina* microalgae : A review of existing literature. *Nutra Foods*, **9** (2)19-26.
- [2] Demir, B.S. and Tükel, S.S. (2010). Purification and characterization of lipase from *Spirulina platensis*. *J. Mol. Catal. B-Enzym.* **64**, 123-8.
- [3] FAO, (2008). Fisheries and Aquaculture Circular No. 1034, A review on culture production and use of *Spirulina* as food for Human and feed for domestic animals and fish
- [4] Hasler, C.M. (2002) Functional foods: benefits, concerns and challenges – a position paper from the American Council on Science and Health. *J.Nutr.* **132**:3772-3781.
- [5] Hayashi O., T.Katoh, Y.Okuwaki (1994) Enhancement of antibody production in mice by dietary *Spirulina platensis*. *J.Nut. Sci.Vitaminol.* (Tokyo) **40**:431-441
- [6] Lisheng L. (1991) Inhibitive rfective and mechanism of polysaccharide of *Spirulina platensis* on transplanted tumor cells in mice. *Marine Sci.Qindao China* **5**:33-38.
- [7] Milasius, K.; Malickaite, R. and Dadeliene, R. (2009) Effects of Spirulina food supplement on blood morphological parameters, biochemical composition and on the immune function of sportsmen. *Biol. Sport* **26** (2); 157-172.
- [8] Miller, L. E.; Ludke, H. R.; Peacock, J. E., and Tomar, H. R. (1991) Manual of Laboratory Immunology. Lea & Fibiger, Philadelphia/London.
- [9] Moorhead K; Capelli B. and Cysewski G. (2005) Nature's Superfood: Spirulina