

IMPACT OF *SPIRULINA* ADMINISTRATION ON RURAL WOMEN HAVING ITCHING PROBLEM ON SKIN

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A clinical study was carried out to find out the impact of *Spirulina* administration on the rural women suffering from itching problem. Periodic blood chemistry revealed significant increase in haemoglobin (Hb), Total Red Blood Corpuscles count (TRBC) and High Density Lipoprotein-Cholesterol (HDL-C) with simultaneous decrease in Erythrocyte Sedimentation Rate (ESR), Total Cholesterol (TC), Triglycerides (TG), Low Density Lipoprotein-Cholesterol (LDL-C), Very Low Density Lipoprotein-Cholesterol (VLDL-C) and Blood Sugar. These overall impact on blood biochemistry may be the possible cause to cure the itching problem.

Keywords: ; Blood biochemistry; Pharmaceutical impacts; *Spirulina platensis*.

Introduction

The recorded history of the consumption of *Spirulina* goes back to the year 1521, when Bernal Diaz del Castillo reported the consumption of *Spirulina* in the vicinity of Mexico City. Due to its unmatched composition *Spirulina* has been declared as the "best food for tomorrow" by the United Nations, at the World food conference in 1974¹. Animal studies have demonstrated several properties of *Spirulina* / *Spirulina* extracts². Beley *et al.* and Fox have reviewed the health benefits of *Spirulina*^{3,4}. Jassby and Seshadri have also approved it as a food supplement^{5,6}.

Though, various studies have ensured the role of *Spirulina* in the treatment of various diseases. Yet the overall impact of *Spirulina platensis* administration has not been on record. Present study was undertaken to find the effect of *Spirulina* administration on the ailing rural women of the village Burthal (Rajasthan), who have been suffering from itching problem on skin.

Material and Method

20 women were opted for this study, These ladies were administered with 1 g *Spirulina* powder in the form of capsules. Each capsule contained 500 mg powder of *Spirulina platensis*. This was in addition to their normal routine diet. Extra precautions have not been suggested.

Initially, blood samples were collected from women to analyse the haemoglobin (Hb), Total Red Blood Corpuscles count (TRBC), Erythrocyte Sedimentation Rate (ESR), Total protein, Triglycerides (TG), Total Cholesterol (TC), High Density Lipoprotein - Cholesterol (HDL-C), Low Density Lipoprotein - Cholesterol (LDL-C) and Very Low Density Lipoprotein - Cholesterol

(VLDL-C) and Blood glucose. After administration of *Spirulina*, the blood samples of ladies were analysed fortnightly on 15th and 30th day, respectively.

Results and Discussion

Rural women showed significantly increased level of Haemoglobin (Hb) after *Spirulina* administration. (Fig. 1). This observation drew its support from the previous work⁷⁻⁹. Hb is the oxygen carrying pigment. Iron is important for the formation of Hb. Bioavailability of iron from *Spirulina* is well documented¹⁰⁻¹² which might have contributed to increased level of Hb in *Spirulina* administered patients.

During the present study, Total Red Blood Corpuscles count (TRBC) was also improved by *Spirulina* administration amongst women. (Fig. 1). Haemoglobin being present in RBC, the enhancement of TRBC was closely relates with Hb contents.

Erythrocyte sedimentation rate (ESR) of women administered with *Spirulina* revealed a very high reduction. (Fig. 1). ESR is associated with most of the acute and chronic infections, allergic reactions & plasma protein concentration. Enhanced ESR indicated the increased activity of disease, while decrease is the sign of less effectivity of the disease. *Spirulina* is known to enhance the immune system of human beings. A Russian patent was awarded for *Spirulina* for normalizing all sensitivities in Chernobyl. Finding of Bounous *et al.*¹³ and Qureshi and Ali¹⁴ also confirmed the role of *Spirulina* in improving the immune system of human beings.

Triglycerides (TG) in the blood serum of women showed considerable reduction after *Spirulina platensis*

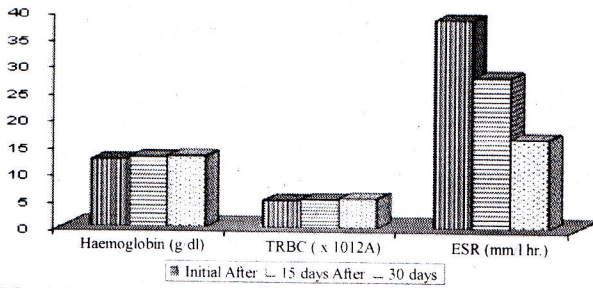


Fig.1. Impact of *Spirulina platensis* administration on the Hb, TRBC and ESR of women suffering from itching problem (Normal values Hb = 11.5-16.5 gm/dl; TRBC = $3.8-5.8 \times 10^{12}/l$ and ESR = 0-20 mm/1st hr)

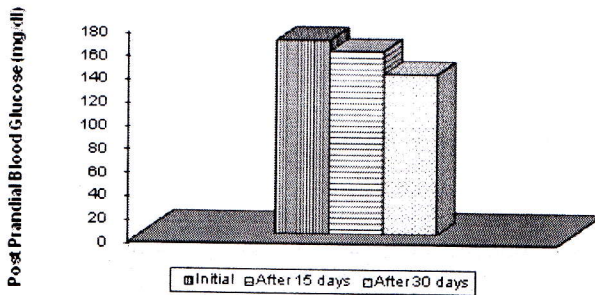


Fig.3. Impact of *Spirulina platensis* administration on the Blood Glucose (Random) of women suffering from itching problem (Normal value < 140 mg/dl)

administration. (Fig. 2). Becker *et al.*⁸, Nayaka *et al.*¹⁵ and Ramamoorthy and Premakumari¹⁶ also observed similar results, where lowering of TG levels was recorded after *Spirulina* supplementation. During digestion process of Triglycerides, fatty acid molecules and glycerol are split apart. In liver, these fatty acids get synthesised into cholesterol and phospholipids¹⁷. Agheli *et al.*¹⁸ suggested the polyunsaturated fatty acids may influence the structure of LDL and HDL by changing the fluidity of their constituent lipids. Thus, the increased proportion of fatty acids due to linolenic acid might have decreased the TG concentration in serum.

Total Cholesterol (TC) level was greatly lowered after the *Spirulina* administration. (Fig. 2). After *Spirulina* administration, a significant reduction in blood TC level was also previously reported^{8,15,16,19-21}.

Spirulina has very less amount of lipid in its biochemical composition. In addition, it contained γ -linolenic acid (GLA) and linolenic acid (LA), polyunsaturated fatty acids²². These were helpful in the reduction of cholesterol and favourably modulated cardiovascular risk factors²³. Nichols and Wood²⁴ stated that GLA is 170 times more effective in lowering the

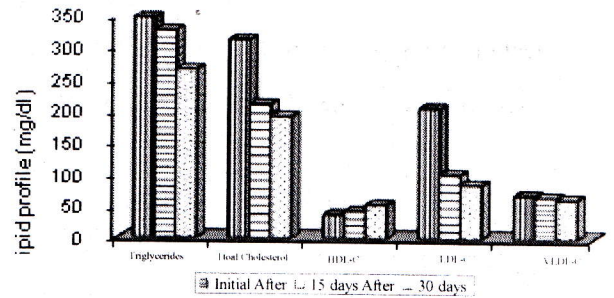


Fig.2. Impact of *Spirulina platensis* administration on the Lipid profile of women suffering from itching problem (Normal values TG = < 160 mg/dl; TC = 140-200 mg/dl; HDL-C = > 40 mg/dl; LDL-C = < 130 mg/dl and VLDL-C = < 35 mg/dl)

plasma cholesterol level than LA. GLA administration with nutritional supplements was helpful to overcome the problem of hypercholesterolemia, as *Spirulina* is nature's second highest source of GLA after human milk.

After *Spirulina* supplementation in women, the increased values of HDL-C was observed. HDL has been recognised as "Good Cholesterol" (Fig. 2). HDL-C enhancing property of *Spirulina* was reported in previous studies^{21,25-28}. Nayaka *et al.*¹⁵ and Ramamoorthy and Premakumari¹⁶ have also registered the similar results with human beings. HDL-C contained a very high concentration of protein (50%) and a small concentration of cholesterol and phospholipids. HDL-C prevented hardening of arteries and protects heart¹⁷. Thus, HDL-C was termed as friendly cholesterol. Dietary supplementation containing low fats and high protein *i.e.* in *Spirulina* may increase the HDL-C level. HDL-C has about 50% protein in its chemical composition and the proteins available in *Spirulina* may synthesize HDL-C.

Low density lipoprotein-cholesterol level of women also showed reduced values after *Spirulina* administration. (Fig. 2). Nayaka *et al.*¹⁵ and Ramamoorthy and Premakumari¹⁶ also found decreased LDL-C by *Spirulina* supplementation. Very low density lipoprotein-cholesterol (VLDL-C) was also reduced in the blood serum of women patients after *Spirulina* supplementation (Fig. 2). VLDL-C reduction by *Spirulina* supplementation has also been recorded¹⁶.

Blood glucose level (Random) was reduced amongst women, after *Spirulina* feeding (Fig. 3). Similar results with *Spirulina* supplementation were observed previously^{5,27-29}.

Blood glucose level is known to be maintained by insulin. But it is also well known that plants do not synthesize insulin. Many amino acids have the stimulating

effect on insulin secretion. The most potent of these are arginine and lysine. These amino acids are very common in *Spirulina*. It may be possible that *Spirulina* enhanced the insulin secretion and by this glucose level was lowered in the serum of *Spirulina* fed women.

Itching problem in these women of the village may be due to elevated levels of ESR (Fig. 1) and blood sugar (Fig. 3). Enhanced level of lipid profile also may be the cause of itching (Fig. 2). These levels of ESR and lipid were brought to the normal level by *Spirulina* supplementation and the women felt relieved of this embarrassing problem. Conclusively it may be stated that *Spirulina* administration improved the haemoglobin, TRBC and HDL-C, while reducing triglycerides, total cholesterol, LDL-C, VLDL-C and blood glucose level and cured the itching problem of skin.

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