European Journal of Medical and Health Sciences
www.ejmed.org

The Contribution of Spirulina Platensis Supplementation on COVID-19 Prevention and Hospitalization

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ABSTRACT

Background & Aims: **Spirulina is a filamentous cyanobacterium known for its high nutritional value and therapeutic properties. The aim of this study was to investigate the role of Spirulina supplementation on coronavirus disease 2019 (COVID-19) prevention and hospitalization.**

Methods: **We studied the state of health among 186 (median age: 47, range: 30-60 years) Greek individuals, non-vaccinated against the COVID-19, for 6 months. Among these, 102 unvaccinated individuals received orally 6 g Spirulina (*Arthrospira platensis*) daily for 6 months. Anthropometric characteristics (height, weight, body mass index / BMI), systolic and diastolic blood pressure, complete blood count and biochemical assessments, were recorded and measured before Spirulina supplementation.**

Results: **Among the 102 unvaccinated individuals who received Spirulina, only 14 (13.7%) contracted SARS-CoV2 (confirmed Delta variant) with mild symptoms and 2 (1.9%) needed hospitalization because of acute viral gastroenteritis. In contrast, among the 84 unvaccinated individuals who did not receive Spirulina, 62 (73.8%) contracted SARS-CoV2 (confirmed Delta variant) with mild symptoms and 17 (20.2%) needed hospitalization. None of the hospitalized patients died.**

Conclusions: **Spirulina supplementation at a dose of 6 g daily can contribute to the war against SARS-CoV2, preventing COVID-19 and reducing the need for hospitalization.**

Keywords: COVID-19, hospitalization, prevention, Spirulina.

Submitted: May 4, 2022

Published: May 30, 2022

ISSN:2593-8339

DOI:10.24018/ejmed.2022.4.3.1355

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I. Introduction

Spirulina, a blue-green alga, is a microscopic filamentous cyanobacterium used for centuries as a safe dietary supplement for both humans and animals [1]. It is produced primarily from two species of cyanobacteria classified into the genus Arthrospira: *Arthrospira platensis* and *Arthrospira maxima.* Spirulina is known not only for its high nutritional value, but for its specific therapeutic properties [1]. Despite the desired anti-viral, anti-inflammatory, anti-oxidant, immunostimulatory, and immunomodulatory properties of Spirulina compounds [2], [3], clinical studies in humans to assess its effectiveness against SARS-CoV2 infections do not exist. The aim of this study was to investigate the role of Spirulina supplementation on coronavirus disease 2019 (COVID-19) prevention and hospitalization.

II. Material and Method

We suggested the administration of Spirulina to 186 Greek individuals, non-vaccinated against the disease for various reasons, with known sociodemographic data, lifestyle, and medical history (recorded in structured form). These persons met the following inclusion criteria:

1) age 30-60 years,
2) negative history for drug or food allergy,
3) absence of diabetes mellitus type 1 or 2, cancer, renal failure, liver dysfunction, congestive heart failure, or chronic obstructive pulmonary disease,
4) no treatment with corticosteroids, blood thinners, immunosuppressants, radiotherapy, or chemotherapy,
5) absence of phenylketonuria,
6) no pregnancy or lactation, and
7) serum 25(OH)D levels > 20 ng/mL.

Among the 186 (87 men, 99 women) unvaccinated individuals, 102 agreed, giving written consent with a signed informed consent form, to receive orally 6 gr of high-quality Spirulina (*Arthrospira platensis*) supplementation (Hellenic Spirulina Net: Production unit: Thermopigi, Sidorokastro, Serres, Central Macedonia, Greece) daily for 6 months: June-November 2021. Anthropometric characteristics (height, weight, body mass index / BMI), systolic and diastolic blood pressure, complete blood count and biochemical assessments, were recorded and measured before Spirulina

supplementation. During the 6-month period, frequent telephone communication with the 186 unvaccinated individuals determined the state of their health and any side effects experienced from Spirulina by those taking it. Any patient with confirmed SARS-CoV2 infection with persistent high fever, breathlessness, blood oxygen saturation level below 93%, persistent pain or pressure in their chest, persistent diarrhea and vomiting, mental confusion, or bluish discoloration of fingers or toes would be referred to the hospital for further management and treatment. Statistical analyses were performed using GraphPad Prism 3.0 (GraphPad Software, Inc., San Diego, CA, USA). Results were expressed as mean±standard deviation (SD). Comparisons of baseline characteristics (gender, age, smoking habit, BMI, blood pressure levels) between the individuals who received Spirulina and those who did not were done using Student's t-test. Significant differences between categorical data were assessed with Fisher's exact test using contingency tables. P-values <0.05 were considered statistically significant.

III. Results

The results of the 186 unvaccinated individuals' (median age: 47, range: 30-60 years) course of health during the 6-month study period are presented in Table I. Among the 102 unvaccinated individuals who received Spirulina, only 14 (13.7%) contracted SARS-CoV2 (confirmed Delta variant) with mild symptoms and 2 (1.9%) needed hospitalization because of acute viral gastroenteritis (fever, abdominal pain, diarrhea and vomiting). In contrast, among the 84 unvaccinated individuals who did not receive Spirulina, 62 (73.8%) contracted SARS-CoV2 (confirmed Delta variant) with mild symptoms and 17 (20.2%) needed hospitalization (of which 8 were diagnosed with pneumonia; 4 with acute respiratory failure; 2 with acute viral gastroenteritis; 1 with pulmonary embolism; 1 with acute respiratory distress syndrome; and 1 with acute pericarditis). None of the hospitalized patients died. There was no statistically significant difference in the gender, age, smoking habit, BMI, or blood pressure levels between the individuals who received Spirulina and those who did not. No side effects, discomfort, or other complaints (except a few cases of mild transient headache) were reported by the 102 individuals who received Spirulina.

Table I: The Outcome of Our Study Population

Outcome	Spirulina intake (n=102)	Spirulina abstention (n=84)	P values
COVID-19			
Yes	14	62	<0.00001*
No	88	22	
Need for hospitalization			
Yes	2	17	<0.00001*
No	100	67	

*: Fisher's exact test

IV. Discussion

The results of our study showed a very significant effect of Spirulina supplementation on COVID-19 prevention and hospitalization. The ability of Spirulina to boost adaptive and innate immunity, such as the antiviral, anti-oxidant and anti-inflammatory properties of its bioactive compounds (e.g. angiotensin-converting enzyme, inhibitor peptides, phycobiliproteins, sulfated polysaccharides, calcium-Spirulan) could possibly justify our results [2], [3]. The absence of side effects and discomfort, and the lack of complaints during the study confirm the safety profile of Spirulina, supported by its long history of use as food source.

In conclusion, our study results demonstrate that, apart from vaccination, masks and social distancing, Spirulina supplementation at a dose of 6 g daily can contribute to the war against SARS-CoV2, preventing COVID-19, reducing the need for hospitalization, and consequently the pressure on the National Health Service. Further clinical randomized trials are necessary to determine the effect of Spirulina supplementation in the treatment of COVID-19.

Acknowledgment

The authors would like to thank all the subjects who participated in this study.

Conflict of Interest

Authors declare that they do not have any conflict of interest.

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