

# Effects of spirulina supplement on children's growth and health

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		<input type="checkbox"/> Protocol
<b>Registration date</b> 12/12/2018	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan
		<input checked="" type="checkbox"/> Results
<b>Last Edited</b> 12/12/2018	<b>Condition category</b> Nutritional, Metabolic, Endocrine	<input type="checkbox"/> Individual participant data

## Plain English summary of protocol

### Background and study aims

Spirulina (*Arthrospira platensis*, SP) is a microalga (microscopic plant that grows in water). It is a source of vitamins and other nutrients and has been considered as a food to combat malnutrition in low-income countries and to improve overall health by the United Nations World Food Conference of 1974. SP is generally recognized as safe (GRAS) for use as an ingredient in foods, at levels ranging from 0.5 to 3.0 g per serving. Very few research studies have been conducted in children. In Cambodia and other countries, SP is frequently provided to children from deprived settings by non-governmental organizations (NGOs), such as charities, operating in schools. SP is given to the children under the assumption that using low doses of SP daily (2 g) will improve the children's growth and health due to SP's positive nutritional content and positive impact on immunity. This strategy has not been investigated within a controlled study. This study aims to test the effects on children aged 5 to 6 years.

### Who can participate?

Children aged 5 to 6 years attending preschool, with the informed oral consent of their parents /guardians and after a medical screening

### What does the study involve?

The children were randomly and allocated Group 1 or Group 0. Group 1 received a 2-g teaspoon of SP powder daily and Group 0 received a 2-g teaspoon of placebo (dummy) powder for 8 weeks (Phase 1). After 8 weeks where the children did not receive SP or placebo, Group 1 received placebo and Group 0 received SP for 8 weeks (Phase 2). In addition to daily meal at school, children received daily one of the two regimens for a period of 2 months: either placebo or SP. The intake and tolerance of supplements were directly observed. Their blood was also taken (4 ml) by experienced nurses from the Cambodian Pasteur Institute at the school before the study, after the end of first phase and second phase. Sampling was not mandatory.

### What are the possible benefits and risks of participating?

Using SP daily was expected to improve the children's growth and health, and decrease the occurrence of anemia and other disease due to SP's positive nutritional content and positive impact on immunity. Only mild and transient side-effects such as nausea and vomiting were expected.

Where is the study run from?  
Antenna Technologies (Cambodia)

When is the study starting and how long is it expected to run for?  
October 2014 to June 2015

Who is funding the study?  
Antenna Cambodia

Who is the main contact?  
Dr Hubert Barennes, barenneshub@yahoo.fr

## Contact information

**Type(s)**  
Scientific

**Contact name**  
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## Additional identifiers

**Protocol serial number**  
0000

## Study information

**Scientific Title**  
Evaluation of daily spirulina as a nutritional supplement in school children: a placebo-controlled randomized study

**Study objectives**  
Daily spirulina supplementation can be beneficial on weight, growth, and hemoglobin level of young children from an impoverished setting in Cambodia.

**Ethics approval required**  
Old ethics approval format

**Ethics approval(s)**

## **Study design**

Single-centre double-blind placebo-controlled cross-over study

## **Primary study design**

Interventional

## **Study type(s)**

Prevention

## **Health condition(s) or problem(s) studied**

Young children from an impoverished setting in Cambodia attending preschools

## **Interventions**

All parents/guardians/caregivers were informed by the school manager and were provided an information file in Khmer. Children of those who provided oral consent to the study were enrolled. The participant information file and informed consent sheet provided the following details: the exact nature of the survey; what it would involve for the participant; the implications and constraints of the protocol; the known side-effects and risks involved in taking part in the study. It was clearly stated that the participant was free to withdraw from the survey at any time for any reason without prejudice to future care at PSE health services or PSE education and with no obligation to give the reason for withdrawal.

An information session in Khmer was conducted at PSE with PSE teachers and staff prior to enrolment to ensure that the parents understood the survey design, objectives and the study activities and that they understood the monitoring and blindness. They were given the opportunity to ask questions and receive answers. Teachers were able to provide additional information to parents/guardians/caregivers.

In case of side effects or disease, children were to be sent to the nursery and, if appropriate, to the PSE doctor. The supplementation was either to be discontinued or decreased and treatment to be provided according to PSE and Cambodian National health guidelines.

The protocol, informed consent form, and participant information sheet were submitted to and received agreement from the Cambodian Research Ethics Committee.

Children (4.9 years, 95%CI: 4.7–5.1; sex ratio F/M: 0.83) attending preschool cared by “Pour un sourire d’enfants” (PSE) a charity-supported training school, were randomly and double-blindly allocated (2 to 1) to SP (Group 1) or placebo (Group 0) 2 g daily for 8 weeks (Phase 1). After 8 weeks of wash-out period, participants were crossed over to the other group (Phase 2). Children were fed once daily at PSE and followed for 8 months.

Anthropometric measurements (weight, height, body mass index [BMI]) and selected hematological data (blood cell count, ferritin and C-reactive protein performed by Pasteur Institute, Cambodia) were assessed before intervention and at the end of each treatment period. Children participating to the 2 phases were pooled defining control and SP groups. Comparison between and within phases and groups were conducted.

## **Intervention Type**

## Supplement

### Primary outcome(s)

1. Change in nutritional status assessed using anthropometric measurements (weight, height, body mass index [BMI]) calculated using UNICEF tools assessed prior to the survey, then 2 months after the first and the second supplementation phases

### Key secondary outcome(s)

1. Tolerability of supplements was directly observed by teachers. Events such as nausea, vomiting, allergic reaction, headache, and fever or other symptoms were recorded daily on a standardized pre-tested one sheet form by the teachers. Standard pre-tested sheets were prepared to make it easy for teachers to record daily any symptomatic health events, compliance or reactions to supplements. Data sheets were monitored daily during the first 2 weeks by a survey assistant, then twice weekly.
2. Occurrence of illness was recorded using the data sheets daily during the first 2 weeks by a survey assistant, then twice weekly. The occurrence of health events or diseases was systematically sought from teachers at each visit in the event of children dropping out.
3. Haematological data, including hemoglobin, blood cell count, C-reactive protein and ferritin, assessed before intervention and at the end of each treatment period

### Completion date

30/06/2015

## Eligibility

### Key inclusion criteria

1. Children aged 5 to 6 years
2. Attending preschool
3. Informed oral consent of their parents/guardians
4. Following a medical screening at PSE health center

### Participant type(s)

Other

### Healthy volunteers allowed

No

### Age group

Child

### Lower age limit

5 years

### Upper age limit

6 years

### Sex

All

### Key exclusion criteria

1. Known allergy to SP before the survey
2. Inability to attend school during the subsequent 8 months

**Date of first enrolment**

01/12/2014

**Date of final enrolment**

15/02/2015

## **Locations**

**Countries of recruitment**

Cambodia

**Study participating centre****Pour un Sourire d'Enfant (PSE) Schools**

Village Trea, Sangkat Stueng Mean Chey, 402

Phnom Penh

Cambodia

12352

## **Sponsor information**

**Organisation**

Antenna Technologies Cambodia

## **Funder(s)**

**Funder type**

Charity

**Funder Name**

Antenna Cambodia

## **Results and Publications**

**Individual participant data (IPD) sharing plan**

The datasets generated and/or analysed during the current study during this study will be included in the subsequent results publication. The data are also available upon request from H Barennes [barenneshub@yahoo.fr](mailto:barenneshub@yahoo.fr) under stata or excel anonymous data.

## IPD sharing plan summary

Available on request

### Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Results article</a>	primary and secondary outcome results	07/12/2022	12/12/2022	Yes	No
<a href="#">Participant information sheet</a>	Participant information sheet	11/11/2025	11/11/2025	No	Yes