

# A randomized placebo-controlled trial for evaluating effects of consumption of perilla fruit (Nga-keemon) oil-added soybean milk on health outcomes and blood biomarkers among healthy subjects

<b>Submission date</b> 19/03/2022	<b>Recruitment status</b> No longer recruiting	<input type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
<b>Registration date</b> 26/03/2022	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input checked="" type="checkbox"/> Results
<b>Last Edited</b> 22/05/2023	<b>Condition category</b> Other	<input type="checkbox"/> Individual participant data

## Plain English summary of protocol

### Background and study aims

Perilla fruit oil (PFO) is rich in omega 3-polyunsaturated fatty acids, particularly alpha-linolenic acid, which has been noted for its numerous health benefits. Functional foods are cornerstone strategies in sustaining wellness in humans. This study aims to develop PFO-fortified soybean milk (PFO-SM), identify its degree of sensory acceptability, and evaluate the relevant health outcomes. This study assesses the effects of the consumption of perilla fruit oil-fortified soybean milk and black sesamin-fortified soybean milk in healthy volunteers.

### Who can participate?

Healthy male and female volunteers aged 20-60 years

### What does the study involve?

Participants are randomly allocated into four groups. Group 1 is given deionized water (DI), Group 2 is given soybean milk (SM), Group 3 is given perilla fruit oil-fortified soybean milk (PFO-SM), and Group 4 is given black sesamin-fortified soybean milk (BS-SM). Participants consume the drink (a 180 ml serving) after meals twice daily for 30 days.

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

In terms of the potential benefits, the participants will find out about their relevant health outcomes, the levels of blood biochemical biomarkers and antioxidant capacities, and applicable immune functions after consumption of the pasteurized PFO-SM drink when compared to the SM and BS-SM drinks. Participants are not expected to suffer any adverse effects nor experience any food allergies related to the consumption of the drinks according to the exclusion criteria. However, the participants may feel slightly uncomfortable or experience very minor levels of pain when blood samples are being collected.

Where is the study run from?  
Chiang Mai University (Thailand)

When is the study starting and how long is it expected to run for?  
January 2015 to April 2015

Who is funding the study?  
1. Agricultural Research Development Agency of Thailand (Thailand)  
2. Chiang Mai University (Thailand)

Who is the main contact?  
Prof. Somdet Srichairatanakool  
somdet.s@cmu.ac.th

## Contact information

**Type(s)**  
Principal investigator

**Contact name**  
Prof Somdet Srichairatanakool

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## Additional identifiers

**Clinical Trials Information System (CTIS)**  
Nil known

**ClinicalTrials.gov (NCT)**  
Nil known

**Protocol serial number**  
Research ID: 2829, Study code No. FAM-2558-02829

## Study information

**Scientific Title**

Perilla frutescens var. keemon fruit oil-fortified soybean milk intake alters levels of serum triglycerides and antioxidant status, and influences phagocytotic activity among healthy subjects

### **Study objectives**

It is hypothesized that Perilla frutescens fruit oil (PFO) which is rich in omega 3-polyunsaturated fatty acids, particularly alpha-linolenic acid (ALA), would be fortified in soybean milk (SM) for production of functional pasteurized PFO-SM drink. The drink would be beneficial for human by improving health indices, hematological parameters and blood biochemical biomarkers, resulting in better quality of life and longevity.

### **Ethics approval required**

Old ethics approval format

### **Ethics approval(s)**

Approved 30/01/2015, the Institutional Review Board (Set 4) of Faculty of Medicine, Chiang Mai University (110 Intawaroros Street, Sripum, Muang Chiang Mai 50200, Thailand; +66 (0)53 936209 Ext 22; researchmed@cmu.ac.th), ref: 2829/study code no. FAM-2558-02829

### **Study design**

Single-center randomized controlled demonstration trial

### **Primary study design**

Interventional

### **Study type(s)**

Quality of life

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

Comparative effects on consumption of perilla fruit oil-fortified soybean milk and black sesamin-fortified soybean milk in healthy adult subjects

### **Interventions**

In this clinical trial, the block randomization method was employed in order to randomise healthy subjects ( $n = 192$ , male and female) who were then divided into four groups ( $n = 48$  each): Group 1 was given deionized water (DI), Group 2 was given soybean milk (SM), Group 3 was given perilla fruit oil-fortified soybean milk (PFO-SM), and Group 4 was given black sesamin-fortified soybean milk (BS-SM). Herein, the above-mentioned method was employed to ensure a balance in the sample size across all groups over time. Accordingly, the subjects in groups 2, 3, and 4 were assigned to consume the drink (180 ml serving) after meals twice daily for 30 days.

All statistical analyses were performed using the SPSS Program version 18.0 (IBM, NY, USA licensed by Chiang Mai University) and expressed as values of mean  $\pm$  standard deviation (SD). When all variables were not distributed normally (Kolmogorov–Smirnov test), nonparametric analysis was performed. Differences observed at different times within the same group were analyzed with the parametric paired samples obtained from the paired Student's t-test or the non-parametric Wilcoxon test. Any differences observed between the two groups were analyzed using the parametric independent samples of the t-test or the non-parametric Mann-Whitney U test. The differences between the three groups were analyzed using the parametric analysis of variance (ANOVA), followed by post hoc Tukey's HSD, Dunnett T3, or the non-parametric Kruskal-Wallis test. Accordingly, p values of  $< 0.05$  were considered statistically significant, as were ap

values of  $< 0.05$  when compared with the baseline (D0) in the same group using a parametric paired Student's t-test; bp values of  $< 0.05$  when compared with the baseline (D0) in the same group using non-parametric Wilcoxon test; cp values of  $< 0.05$  when compared between changes of three groups in the brackets using parametric one-way ANOVA followed by post hoc Tukey's HSD or Dunnett T3 tests; and dp values of  $< 0.05$  when comparisons were made between changes of the 3 groups in the brackets using non-parametric Kruskal-Wallis test.

## **Intervention Type**

Supplement

## **Primary outcome(s)**

1. Systolic/diastolic blood pressure measured using an aneroid sphygmomanometer with a cuff at the baseline (day 0) and at the end of the study (day 30)
2. Hematological parameters measured using an automated cell counter/analyzer (Beckman Coulter Life Sciences, Indianapolis, NJ, USA) according to the manufacturer's instructions on days 0 and 30
3. Blood biochemical parameters, including blood urea nitrogen (BUN), creatinine (CRE), aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), total cholesterol (TC), triglycerides (TG), high-density lipoprotein-cholesterol (HDL-C), and low-density lipoprotein-cholesterol (LDL-C), analyzed using an automated clinical chemistry analyzer (Randox Laboratories Limited, County Antrim, UK) according to the manufacturer's instructions on days 0 and 30
4. Phagocytotic activity in the blood measured according to established methods on days 0 and 30
5. ROS in RBC detected using the dichlorofluorescein diacetate/flow cytometry method on days 0 and 30
6. Serum thiobarbituric acid-reactive substance (TBARS) concentrations measured using the colorimetric method on days 0 and 30
7. Superoxide dismutase (SOD) activity determined using Dojindo's highly water-soluble tetrazolium salt with WST-1 as an electron acceptor according to the procedure described by the manufacturer on days 0 and 30
8. Serum reduced glutathione (GSH) concentration determined based on the non-enzymatic reduction of 5,5'-dithiobis(2-nitrobenzoic acid) substrate to yellow-colored 5-thio-2-nitrobenzoic acid product on days 0 and 30
9. Total antioxidant capacity (TAC) value in the serum measured using 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay on days 0 and 30

## **Key secondary outcome(s)**

There are no secondary outcome measures

## **Completion date**

10/04/2015

## **Eligibility**

### **Key inclusion criteria**

1. Not allergic to soybeans or perilla nutlets
2. Not currently participating in any vitamin, supplementary food, or any other controlled diet programs
3. Aged 20-60 years old

**Participant type(s)**

Healthy volunteer

**Healthy volunteers allowed**

No

**Age group**

Adult

**Sex**

All

**Total final enrolment**

196

**Key exclusion criteria**

Does not meet the inclusion criteria

**Date of first enrolment**

10/02/2015

**Date of final enrolment**

10/03/2015

## **Locations**

**Countries of recruitment**

Thailand

**Study participating centre****Chiang Mai University**

Department of Family Medicine

Faculty of Medicine

110 Intawaroros Street

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Chiang Mai

Thailand

50200

## **Sponsor information**

**Organisation**

Agricultural Research Development Agency of Thailand

**Organisation**

Chiang Mai University

**ROR**

<https://ror.org/05m2fq25>

**Funder(s)****Funder type**

Government

**Funder Name**

Agricultural Research Development Agency

**Alternative Name(s)**

ARDA

**Funding Body Type**

Private sector organisation

**Funding Body Subtype**

Other non-profit organizations

**Location**

Thailand

**Funder Name**

Chiang Mai University

**Alternative Name(s)**

Chiang Mai University, THAILAND, , , , CMU

**Funding Body Type**

Government organisation

**Funding Body Subtype**

Universities (academic only)

**Location**

Thailand

**Results and Publications**

## Individual participant data (IPD) sharing plan

If access to the datasets and the data itself is needed, Dr Winthana Kusirin, PhD., RN (Midwifery) can be contacted at [wkusiris@gmail.com](mailto:wkusiris@gmail.com). The data will become available from 01/04/2022 and remain available until 31/03/2027. All data will also be accessible in the supplementary files and will be shared with Dr Winthana Kusirisin.

## 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>		21/04/2022	22/05/2023	Yes	No
<a href="#">Participant information sheet</a>	Participant information sheet	11/11/2025	11/11/2025	No	Yes