

Zinc biofortified rice efficacy trial

Submission date 26/09/2024	Recruitment status No longer recruiting	<input checked="" type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
Registration date 02/10/2024	Overall study status Completed	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
Last Edited 10/01/2025	Condition category Nutritional, Metabolic, Endocrine	<input type="checkbox"/> Individual participant data <input checked="" type="checkbox"/> Record updated in last year

Plain English summary of protocol

Background and study aims

Zinc deficiency is common among women and children in low- and middle-income countries (LMICs) due to their plant-based diets, which lack zinc and contain factors that prevent zinc absorption. To address this, we are testing zinc biofortified rice as a potential solution. Previous studies with biofortified crops like wheat, rice, and pearl millet did not show significant improvements in zinc levels. Therefore, we are conducting a community-based randomized controlled trial to test the effectiveness of zinc-biofortified rice in improving zinc status among young women in rural Bangladesh.

Who can participate?

Young non-pregnant, non-lactating (NPNL) women aged 20 to 29 years living in the rural area of Birganj, Dinajpur in Bangladesh can participate in this study.

What does the study involve?

Participants will be divided into two groups. One group will receive high-zinc biofortified rice (ZBR) for themselves and their families for three months. The other group will receive low-zinc conventional rice (CR) for the same period. We will conduct surveys at the beginning and end of the study to collect data on health and diet, and blood samples will be taken to measure zinc levels and other health markers. We will also test the rice for zinc content before and after cooking.

What are the possible benefits and risks of participating?

Participants will receive a supply of rice for their families for three months and will get their blood test results. The study poses minimal risk, with the main discomfort being blood sample collection. All precautions will be taken to ensure safety. The study's findings could help policymakers promote zinc-biofortified rice, benefiting the wider population.

Where is the study run from?

The study is being conducted by Griffith University in Queensland, Australia, in partnership with BRAC James P Grant School of Public Health, BRAC University in Bangladesh.

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

August 2023 to March 2025

Who is funding the study?
Nestle Foundation (Switzerland)

Who is the main contact?
Dr Faruk Ahmed, f.ahmed@griffith.edu.au

Contact information

Type(s)

Scientific, Principal Investigator

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Additional identifiers

EudraCT/CTIS number

Nil known

IRAS number

ClinicalTrials.gov number

Nil known

Secondary identifying numbers

Griffith University IRB Ref No: 2023/611

Study information

Scientific Title

Efficacy of zinc biofortified rice for preventing zinc deficiency in Bangladesh: a randomized controlled trial

Study objectives

The study hypothesizes that consuming zinc-biofortified rice for three months is going to improve zinc status, measured by plasma zinc concentration, among young non-pregnant non-lactating rural women (aged between 20-29 years) in rural Bangladesh compared to consumption of low-zinc conventional rice for the same duration.

Ethics approval required

Ethics approval required

Ethics approval(s)

1. Approved 25/08/2023, Human Research Ethics Committee (EC00162) (Research Ethics and Integrity, Office for Research, Bray Centre (N54), Nathan Campus, Griffith University, Brisbane, 4111, Australia; +61 737352069; research-ethics@griffith.edu.au), ref: 2023/611
2. Approved 03/06/2024, Institutional Review Board, BRAC James P Grant School of Public Health, BRAC University (65, Bir Uttam AK Khandakar Road, Mohakhali, Dhaka, 1212, Bangladesh; +88-2-48812213-18; irb-jpgsph@bracu.ac.bd), ref: IRB-2024-IS-08

Study design

Community-based interventional randomized controlled trial

Primary study design

Interventional

Secondary study design

Randomised controlled trial

Study setting(s)

Community

Study type(s)

Efficacy

Participant information sheet

See study outputs table

Health condition(s) or problem(s) studied

Plasma zinc concentration, among young non-pregnant non-lactating rural women

Interventions

This will be a community-based randomized controlled trial where the participants will be assigned into two arms, using simple random sampling. participants in the intervention arm will receive a raw rice supply of zinc-biofortified rice (ZBR; BRRI-100 variety) for three months for themselves and their family members, and participants in the control arm will receive a raw rice supply of low-zinc conventional rice (CR) for themselves and their family members for the same duration.

The participants are asked to consume the supplied rice ad libitum along with their habitual diet (other food items except rice).

Baseline and endline surveys will be carried out to detect the difference in plasma zinc concentration among the study participants and determine the treatment effect.

Compliance will be monitored, and dietary intake will be assessed to estimate zinc intake during the study period.

Intervention Type

Other

Primary outcome measure

Plasma zinc concentration, measured from plasma sample collected at baseline and 3 months (endline) analysed by atomic absorption spectrometry. The value will be further adjusted for serum C-reactive Protein (CRP) and alpha-1 acid glycoprotein (AGP) which will be measured from serum using commercial ELISA kits at similar timepoints.

Secondary outcome measures

Current secondary outcome measures as of 07/10/2024:

1. Zinc deficiency measured as the fraction of participants having a PZC level below the cutoff of the normal range provided by the International Zinc Nutrition Consultative Group (IZiNCG) for the age and sex of the individual. The outcome will be measured at baseline and 3 months (endline).
2. Morbidity measured by the frequency and duration of common morbidities such as fever, diarrhoea, sore throat, cold and cough, body pain, and vomiting. The data will be collected at baseline, 2 weeks, 4 weeks, 6 weeks, 8 weeks, 10 weeks and 12 weeks (3 months, endline) from the participants (self-report), converted into longitudinal prevalence (LP) and compared between two arms.

Previous secondary outcome measures:

1. Zinc deficiency measured as the fraction of participants having a PZC level below the cutoff of the normal range provided by the International Zinc Nutrition Consultative Group (IZiNCG) for the age and sex of the individual. The outcome will be measured at baseline and 3 months (endline).
2. Morbidity measured by the frequency and duration of common morbidities such as fever, diarrhoea, sore throat, cold and cough, body pain, and vomiting. The data will be collected from the participants (self-report) at baseline and 3 months (endline).

Overall study start date

25/08/2023

Completion date

31/03/2025

Eligibility

Key inclusion criteria

1. Healthy non-pregnant, non-lactating women aged between 20 and 29 years.
2. Residing in the study area and intending to live there for the next six months.
3. Did not consume any micronutrient supplementation (including iron folic acid supplementation) in the preceding 3 months.
4. Not recipients of ration from any government safety net programs.
5. Willing to participate in the study.

Participant type(s)

Healthy volunteer

Age group

Adult

Lower age limit

20 Years

Upper age limit

29 Years

Sex

Female

Target number of participants

200 in total

Total final enrolment

197

Key exclusion criteria

1. Participants having any acute, sub-acute or chronic condition that prevents them from complying with the study procedure.
2. Participants whose families are recipients of ration from any government social safety net program.

Date of first enrolment

14/11/2024

Date of final enrolment

30/11/2024

Locations

Countries of recruitment

Australia

Bangladesh

Study participating centre

BRAC James P Grant School of Public Health, BRAC University

65, Bir Uttam AK Khandakar Road, Mohakhali

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Study participating centre

Griffith University

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Sponsor information

Organisation

Nestlé Foundation

Sponsor details

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Sponsor type

Research council

Website

<http://www.nestlefoundation.org>

ROR

<https://ror.org/021k07d19>

Funder(s)

Funder type

Research council

Funder Name

Fondation Nestlé

Alternative Name(s)

Nestlé Foundation, Fundación Nestlé

Funding Body Type

Private sector organisation

Funding Body Subtype

Trusts, charities, foundations (both public and private)

Location

Switzerland

Results and Publications

Publication and dissemination plan

We are planning to publish at least four publications in peer-reviewed journals as described below:

Publication 1: Validation of semi-quantitative food frequency questionnaire for assessing zinc intake among young non-pregnant non-lactating women living in rural Bangladesh, against two non-consecutive 24-hour dietary recalls.

Publication 2: Loss of zinc due to cooking from zinc biofortified rice and conventional rice.

Publication 3: Knowledge about zinc nutrition among young non-pregnant non-lactating women living in rural Bangladesh, and their attitude towards zinc-biofortified rice as an approach for

alleviating zinc deficiency in Bangladesh
Publication 4: Efficacy of zinc-biofortified rice in improving zinc status among young non-pregnant non-lactating women living in rural Bangladesh

In addition to these publications, we plan to disseminate the findings of the efficacy trial by arranging a seminar among relevant stakeholders in Bangladesh.

Intention to publish date

31/10/2025

Individual participant data (IPD) sharing plan

IPD will be stored on a non-publicly available repository and will be made available on request. All data will be deidentified while being entered into a secure electronic database in a computer server at Griffith University Research Storage Platform (<https://research-storage.griffith.edu.au/>).

IPD sharing plan summary

Stored in non-publicly available repository, Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Participant information sheet			29/11/2024	No	Yes