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Effect of Sin Lek Rice Intervention on Cognitive Function, Dietary Patterns, and Fecal Microbiota of Elementary School Children in Chiang Rai, Thailand

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Presenter Information

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Setthavongsack, A., Popluechai, S., Shannon, J., Denny, J., Gentekaki, E., Kespechara, K., Gruneck, L., Sharpton, T. J., Niwed, E., Marriott, L. K. (2020).

Oregon Health & Science University, Portland State University, Mae Fah Luang University

Background

Prospective clinical trial studying a dietary intervention of Sin Lek rice using a crossover design in Thai adolescents.
Objectives:
1. Determine differences in the microbiome pre and post sin lek rice consumption and whether microbiome changes are different between students consuming sin lek rice and those consuming traditional white rice.

2. Quantify **changes in body mass index** pre and post sin lek rice consumption and differences in change in body mass index between groups (sin lek vs. traditional white rice)
3. Estimate the effect of sin lek rice versus traditional white rice consumption on **cognitive function** as determined by performance on short-term working memory and attention tasks.

Materials and Methods

• Study population:
  • 1st to 6th graders in Chiang Rai, Thailand. N= 127
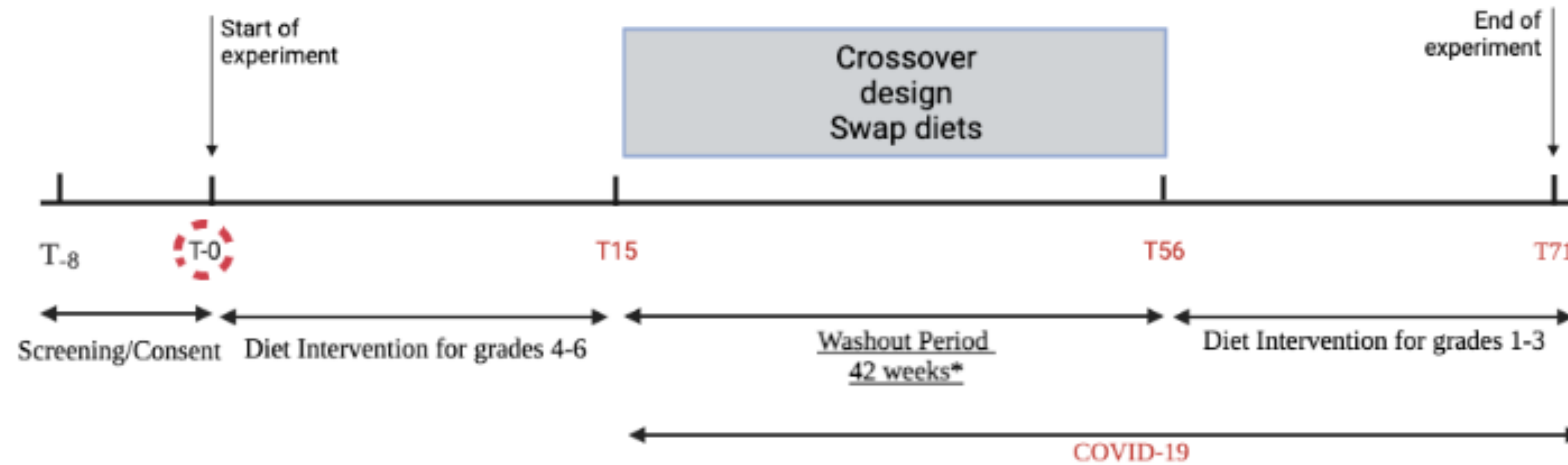
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•Collect fecal matter for the gut microbiome before and after the washout period and at key study timepoints
• Body size (height, weight, BMI)
• School attendance and performance
• Additional analysis such as sex, age, how they were delivered, and how the children were fed as infants were all recorded.

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•*Let's Get Healthy!* was used to measure cognitive function and diet:
  •Short term working memory (Corsi)
  •Attention (Psychomotor vigilance)
  •Impulsivity (Barratt impulsivness scale, BIS-15)
  •Southeast Asian dietary assessment (OHSU)
•Data analysis on cognitive data using the program IBM SPSS (Statistical Package for the Social Sciences) with diet and additional variables.

Photos by Lisa Marriott

Start of experiment

T-0

Crossover design
Swap diets

End of experiment

T-8   T15   T56   T71

Screening/Consent   Diet Intervention for grades 4-6   Washout Period 42 weeks*   Diet Intervention for grades 1-3

COVID-19

Data Analysis at Baseline

	Outcome	Sex	Feeding method
Cognitive			
	Memory (CORSI)	p<0.007; F>M	ns
	Attention (PVT)	ns	p< 0.01
	Impulsivity (BIS-15)	ns	p< 0.04
Diet			
	High Sugar	p< 0.01; F>M	ns
	High Salt	p< 0.02; F>M	ns

A significant difference between groups was detected by a Wilcoxon rank sum test ($p < 0.05$)

Bacteria	T0	T15	T56	T71
Total_bacteria	p= 0.25	p= 0.37	p= 0.4	p= 0.54
Firmicutes	**p= 0.037***	p= 1	p= 0.95	p= 0.83
Bacteroidetes	p= 0.33	p= 0.67	p= 0.54	**p= 4.9e-10***
Gamma_proteobacteria	p= 0.42	p= 0.61	p= 0.63	p= 0.13
Prevotella	p= 0.54	p= 0.67	p= 0.62	p= 0.14
Roseburia	**p= 0.016***	p= 0.79	p= 0.96	p= 0.84
Ruminococcus	**p= 0.012***	p= 0.16	p= 0.16	p= 0.48
Faecalibacterium	**p= 0.041***	p= 0.0096	p= 0.081	p= 0.18
Bacteroides	p= 0.92	p= 0.84	p= 0.9	p= 0.88
Akkermansia	p= 0.94	p= 0.085	p= 0.15	p= 0.78
Bifidobacteria	**p=0.0035***	p= 0.77	p= 0.9	**p= 0.0041***
Lactobacillus	p= 0.32	p= 0.46	p= 0.41	p= 0.13

Results

Dietary estimate the effect of Sin Lek rice versus traditional white rice consumption on **cognitive function** as determined by performance on short-term working memory and attention tasks
At **baseline**:
1. Females had higher short term working memory than males
2. Those who were fed formula had lower attention and less impulsivity
3. Impulsivity varied by age, ethnicity and feeding method
At subsequence timepoints:
• Statistical analyses in progress

Conclusions

• Gut microbiome can be measured in a Thai adolescent population and linked to cognitive and dietary outcomes
• Further analyses are needed to understand the impact of intervention on these measures

Future Directions

• Continue longitudinal analyses
• MFU is commencing phase two in the next year involving education and agriculture.
• Applied for Fulbright, extending project to study mental health and COVID-19 impacts with same the cohort, investigator and school

Acknowledgments