



The PWU School of
NUTRITION



Cholesterol and Glucose Lowering Effects of Brown Rice Among Hypercholesterolemic Patients

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Outline of presentation

- Introduction
- Objectives of the study
- Methods
- Results
- Conclusion
- Recommendations

1. Introduction

THE GLOBAL BURDEN

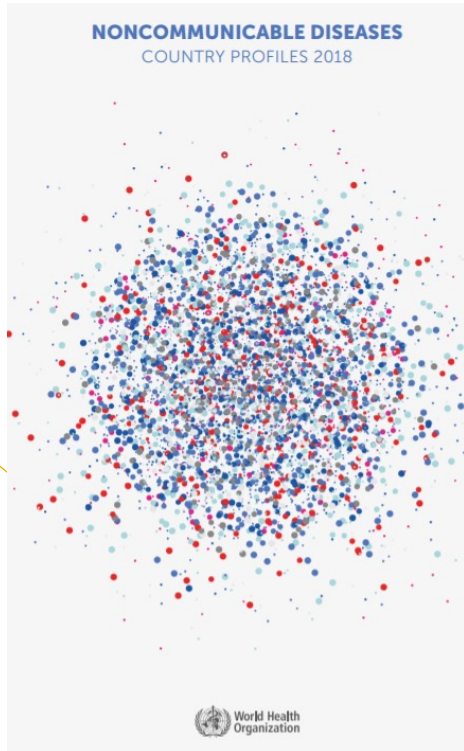
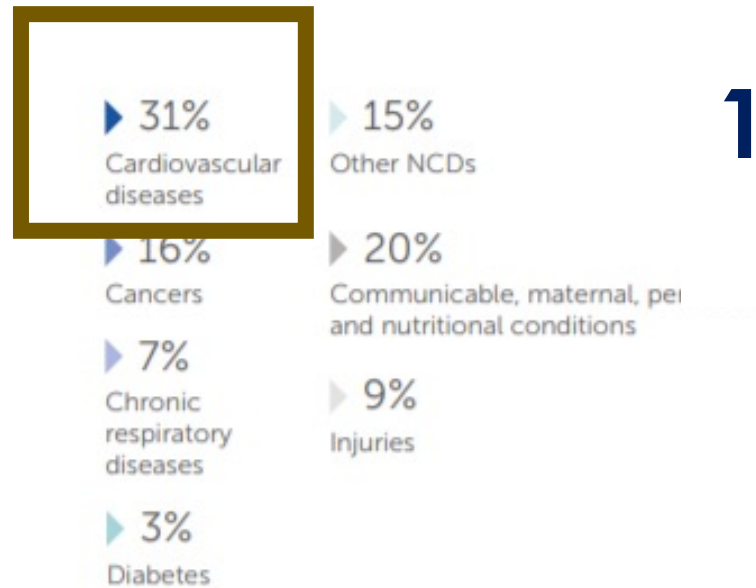
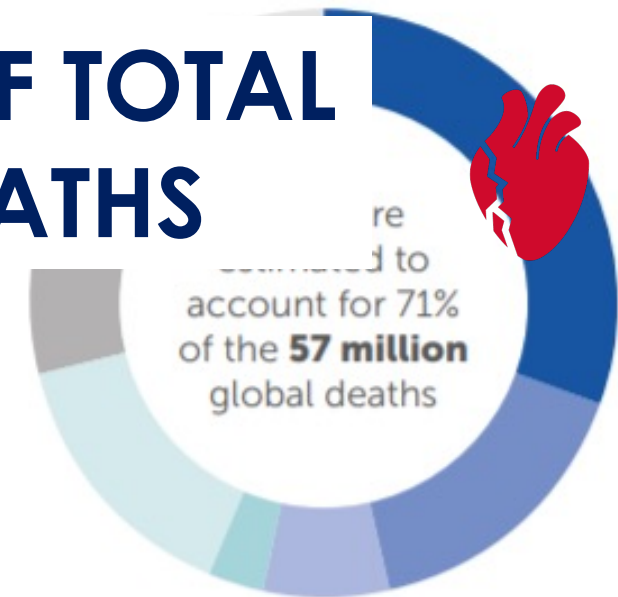


FIGURE 1: GLOBAL MORTALITY (% OF TOTAL DEATHS), ALL AGES, BOTH SEXES, 2016



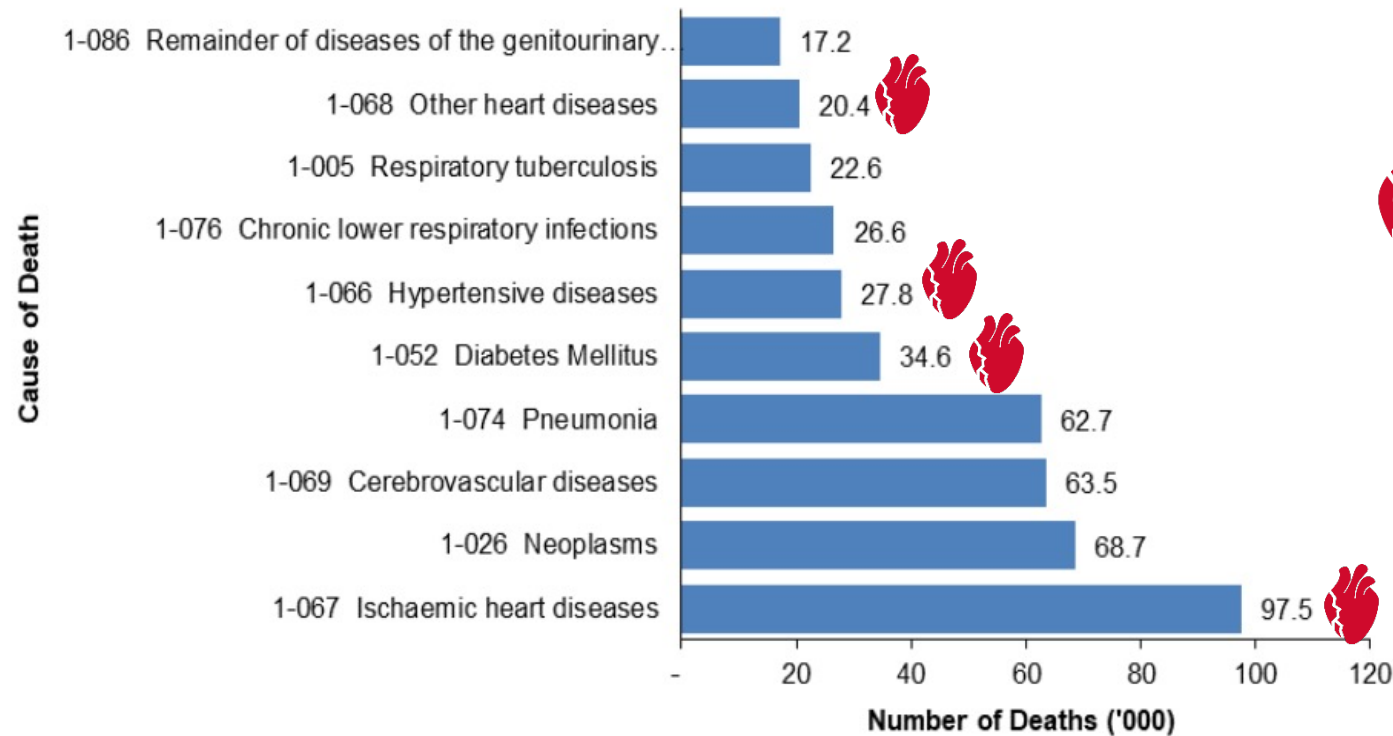
1/3 OF TOTAL DEATHS



1. Introduction

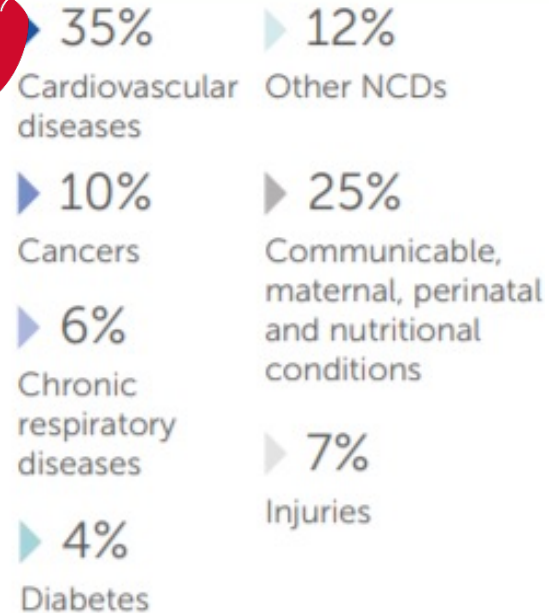
PHILIPPINES

Figure 9. Ten Leading Causes of Death, Philippines: 2019



2016 TOTAL POPULATION: 103 300 000
2016 TOTAL DEATHS: 663 000

PROPORTIONAL MORTALITY



1/3 OF TOTAL DEATHS

account for **67%** of all deaths.

1. Introduction

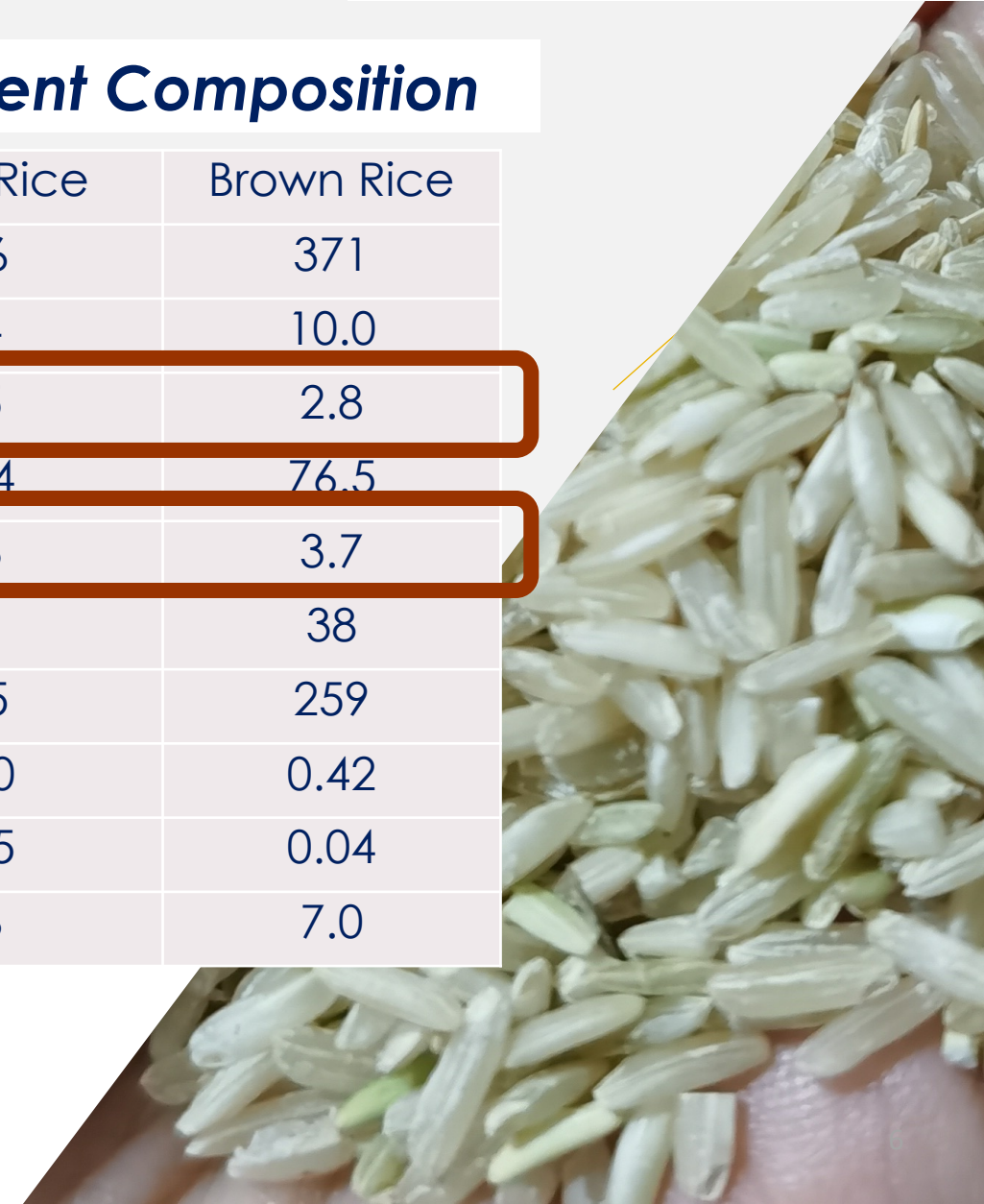
Comparison of the Nutrient Composition

Nutrients	White Rice	Brown Rice
Energy (kcal)	356	371
Protein (g)	7.4	10.0
Fat (g)	0.5	2.8
Carbohydrate (g)	80.4	76.5
Dietary Fiber (g)	0.6	3.7
Calcium (mg)	27	38
Phosphorus (mg)	155	259
Thiamin (mg)	0.10	0.42
Riboflavin (mg)	0.05	0.04
Niacin (mg)	2.8	7.0

- **Unmilled or partly milled**
- **Staple**
- **More nutritious than white rice**

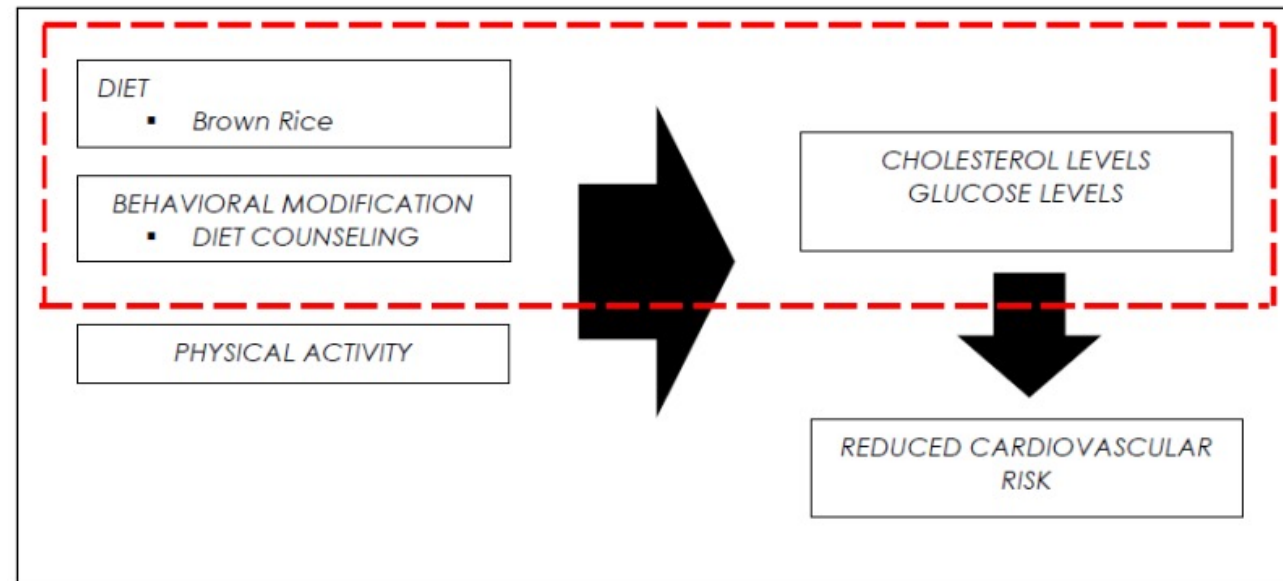
FNRI, The Philippine Food Composition Tables, 1997

Studies by: Panlasigui et al., Kahlon, et al. (1996), Most (2005) Vissers et. Al, (2000)

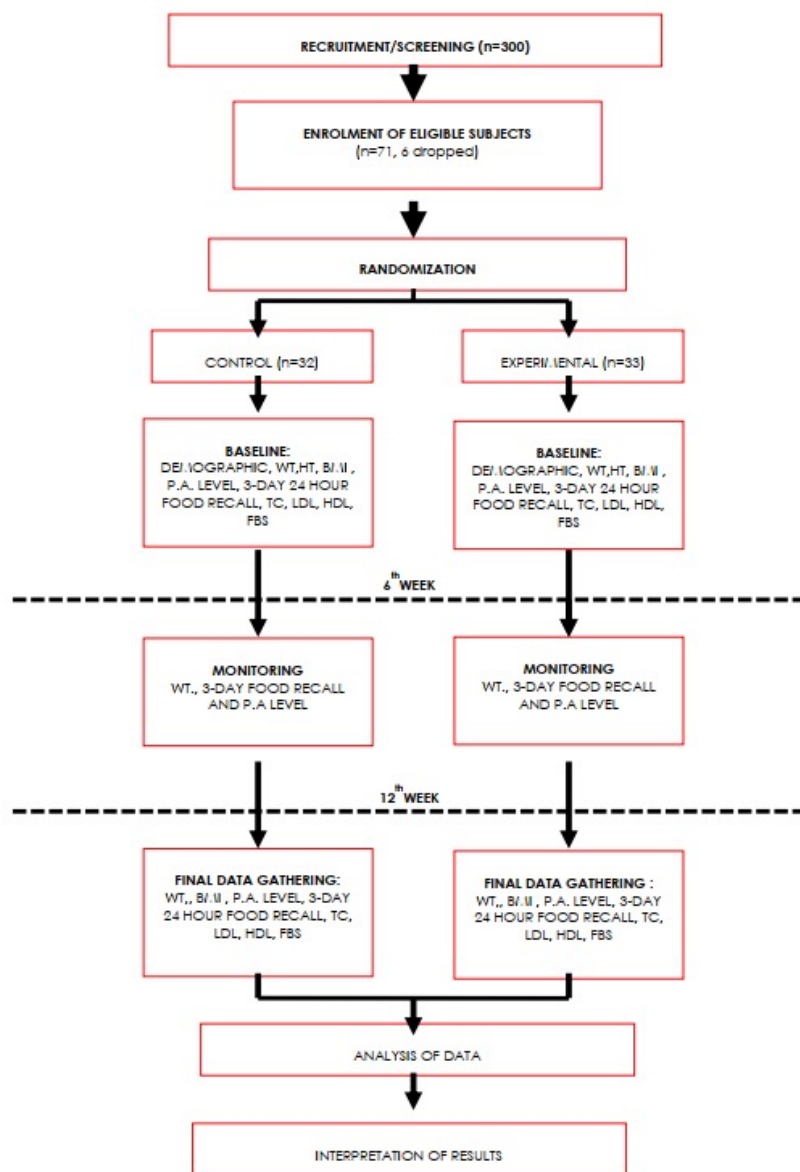


Objective

- this study aimed to determine the efficacy **of brown rice as a dietary staple** in **decreasing cholesterol levels blood sugar levels** after twelve weeks among hypercholesterolemic individuals.



Methods:



Duration: 12 weeks

Participants:

- randomly assigned to control (WR) or intervention (BR) group
- nutrition counseling

Feeding intervention:

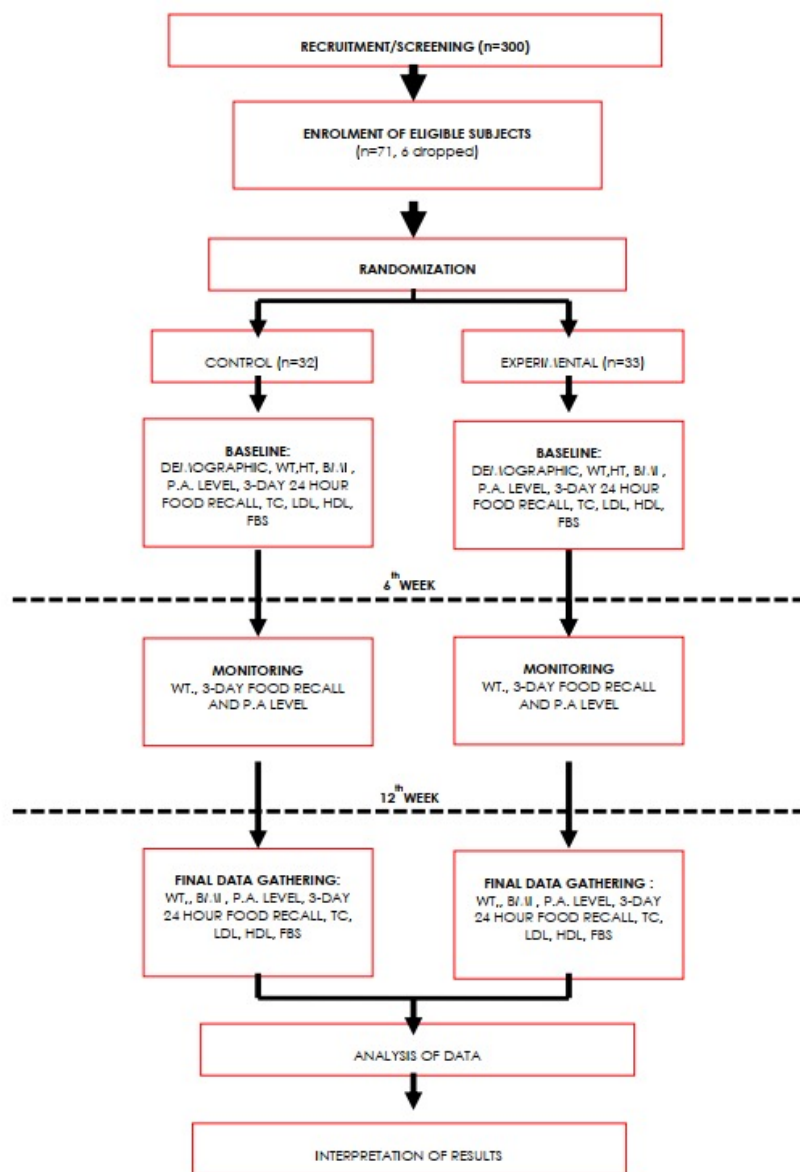
- based on diet plan
- supplied for lunch and dinner

Ethics Clearance:

- ERB- NIH Panel (protocol # NIH 2011-02)

Figure 2. Research Process Flow

Methods:



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Figure 2. Research Process Flow

Methods:

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Cholesterol and glucose lowering effects of brown rice among hypercholesterolemic patients
1st Nutrition Research Forum, National Nutrition Council
September 8, 2021

Results:

Baseline Characteristics of Participants (Between groups)

VARIABLES	CONTROL (WR)	EXPERIMENTAL (BR)	<i>p</i> -value*
	Mean ± SD n=33	Mean ± SD n=32	
ANTHROPOMETRIC MEASUREMENTS			
Height (m)	1.63 ± 0.09	1.59 ± 0.07	0.075
Weight (kg)	69.74 ± 12.81	62.95 ± 9.78	0.02
BMI (ht/m²)	26.14 ± 3.61	24.79 ± 3.56	0.135
PHYSICAL ACTIVITY			
IPAQ (METs)	1203.64 ± 853.08	1314.16 ± 855.28	0.604
DIETARY INTAKE			
Kcal	1604.64 ± 534.59	1546.46 ± 386.16	0.618
CHO (g)	273.09 ± 104.11	252.78 ± 79.10	0.38
CHON (g)	43.2 ± 11.90	47.15 ± 15.77	0.257
FAT (g)	37.73 ± 16.63	38.56 ± 14.77	0.834
FIBER (g)	7.77 ± 2.46	8.04 ± 3.6	0.726
BIOCHEMICAL (LIPID PROFILE AND FBS)			
Total Cholesterol (mg/dL)	224.37 ± 19.25	222.88 ± 22.10	0.773
HDL (mg/dL)	55.60 ± 19.56	54.16 ± 17.17	0.754
LDL (mg/dL)	151.51 ± 21.78	147.86 ± 19.89	0.484
FBS (mg/dL)	102.61 ± 13.55	101.41 ± 10.36	0.69

*p value = <0.05 is set as level of significance (independent sample t-test)

- No significant difference in:
 - BMI
 - Physical activity
 - Diet
 - Lipid profile
 - FBS

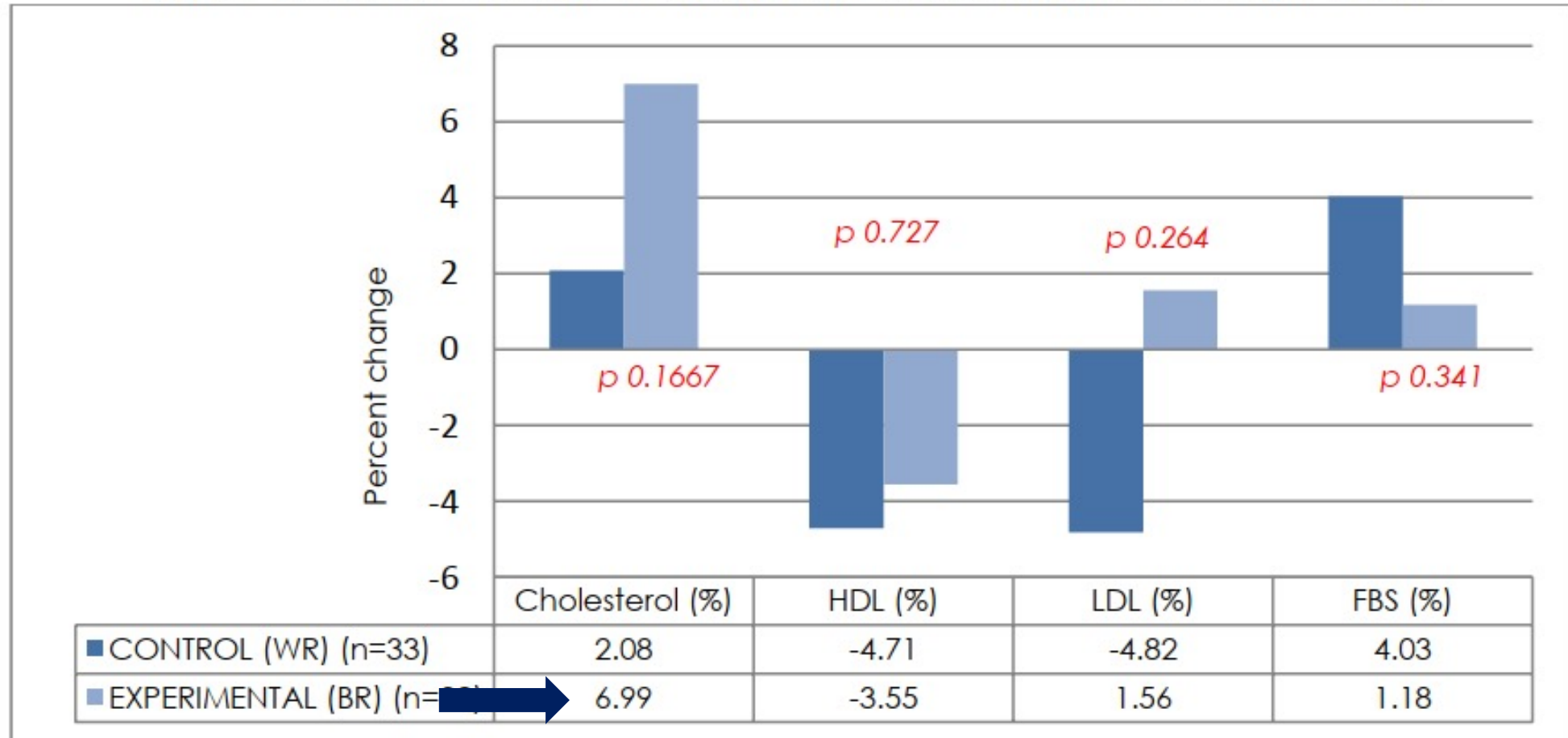
Results:

Table 5
Difference between baseline and endline measure of both groups

VARIABLES	CONTROL (WR)		*p-value	EXPERIMENTAL (BR)		*p-value
	Mean ± SD n=33			Mean ± SD n=32		
	BASELINE	ENDLINE		BASELINE	ENDLINE	
ANTHROPOMETRIC MEASUREMENTS						
Weight (kg)	69.74 ± 12.81	69.51±12.59	0.942	62.95 ± 9.78	61.66±9.35	0.593
BMI (ht/m²)	26.14 ± 3.61	26.04±3.45	0.91	24.79 ± 3.56	24.24±3.13	0.509
PHYSICAL ACTIVITY						
IPAQ (METs)	1203.63 ± 853.08	983.65±708.13	0.259	1314.15 ± 855.28	1132.17±783.70	0.378
DIETARY INTAKE						
Kcal	1604.64 ± 534.59	1477.43±340.98	0.253	1546.46 ± 386.16	1683.05±506.01	0.229
CHO (g)	273.09 ± 104.11	245.85±66.8	0.211	252.78 ± 79.10	268.78±108.41	.502
CHON (g)	43.2 ± 11.90	42.23±10.88	0.732	47.15 ± 15.77	53.78±17.06	0.112
FAT (g)	37.73 ± 16.63	36.16±12.43	0.665	38.56 ± 14.77	43.66±14.95	0.174
FIBER (g)	7.77±2.46	7.10±2.47	0.273	8.04±3.61	9.90±3.76	0.048
BIOCHEMICAL (LIPID PROFILE AND FBS)						
Cholesterol (mg/dL)	224.37 ± 19.25	217.81 ± 27.41	0.265	222.88 ± 22.10	208.56± 24.04	0.016
HDL (mg/dL)	55.60 ± 19.56	55.74±15.37	0.974	54.16 ± 17.17	56.88± 18.48	0.545
LDL (mg/dL)	151.51 ± 21.78	158.27±26.27	0.257	147.86 ± 19.89	148.78± 29.13	0.884
FBS (mg/dL)	102.61 ± 13.55	98.57±11.39	0.194	101.41 ± 10.36	99.25± 8.57	0.368

Results:

Figure 5: Percent Change in Lipid profile and Fasting Blood Sugar Levels





Discussion:

No significant difference in endline TC levels between group.
BR had higher reduction from baseline values.
Percent change after twelve weeks:

WR:	2.08%
BR:	6.99 %

RICE BRAN

Oryzanol: antioxidant activity, reduction of serum cholesterol, reduction of cholesterol absorption, increase in HDL

RICE BRAN OIL

Tocotrienols and *B*-sitosterol: cholesterol lowering effects, reduced absorption

FIBER

Reduced cholesterol absorption, decreased bile reabsorption

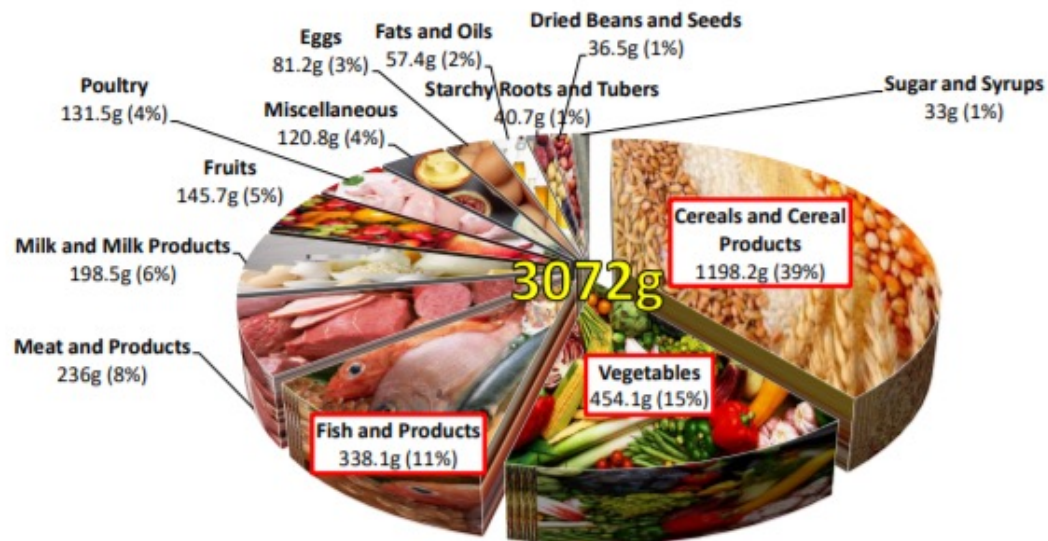
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- Liang YT, Wong WT, Guan L, Tian XY, Ma KY, Huang Y, Chen ZY. *Atherosclerosis.* 2011 Nov;219(1):124-33. doi: 10.1016/j.atherosclerosis.2011.06.004.

Conclusion:

A 6% decrease in total cholesterol among hypercholesterolemic individuals after twelve weeks of brown rice consumption along with nutrition counseling may help reduce total cholesterol.

Mean one-day household food intake by food group and percent contribution to the total intake: Philippines, 2018



<http://enutrition.fnri.dost.gov.ph/>

- ✓ It is practical
- ✓ Staple
- ✓ Small food based change

Recommendations:

- ✓ **Replacing daily intake of white rice with brown rice**
 - ✓ **Nutrition counseling**
 - ✓ Increase in advocacy campaigns on the benefits of brown rice
 - ✓ Increase in promotion in consumption: household and food establishments
-
- **Further studies**
 - controlled environment
 - strict monitoring of other risk factors (SFA, PA, smoking, alcohol intake)
 - Longer duration- long term effects



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