INTAKES & BARRIERS TO CONSUMPTION OF WHOLE GRAINS (EVIDENCE FROM INDIA)

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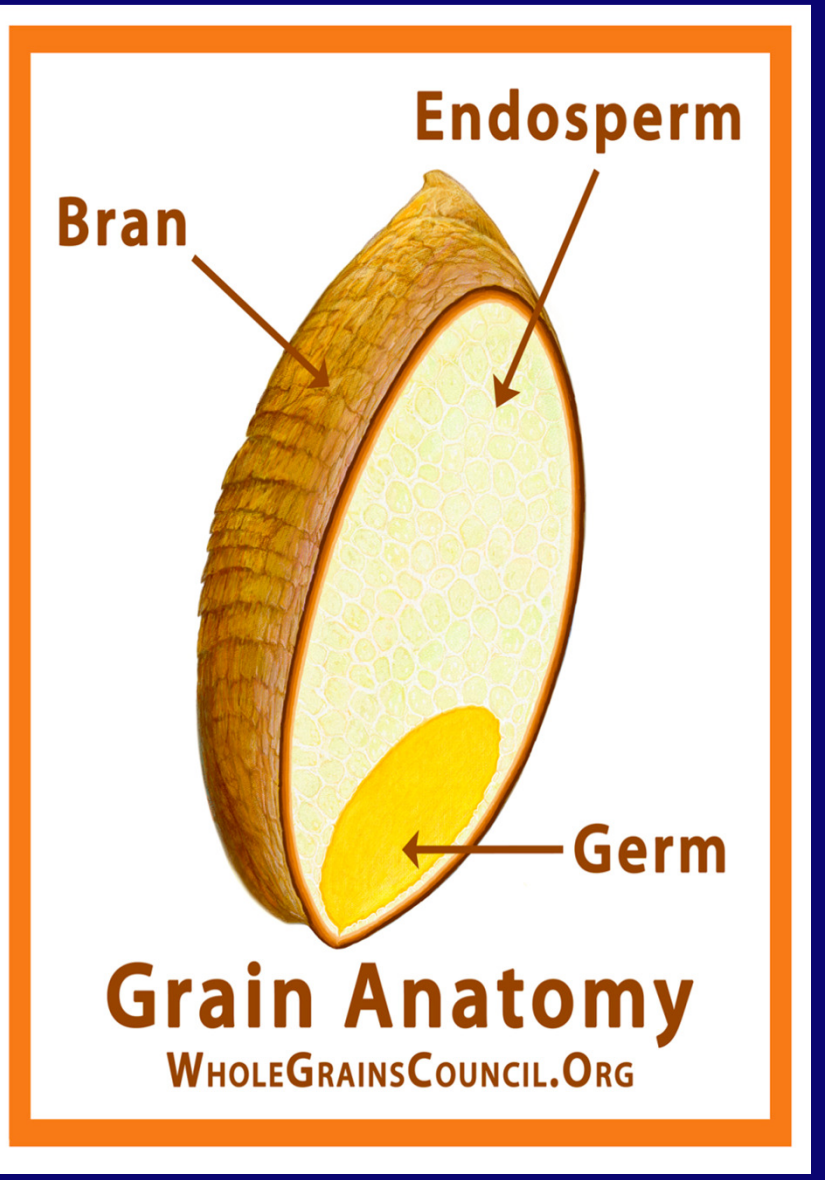
WHOLE GRAINS

Whole Grain Council, 2004

"100% of the original kernel – all of the bran, germ, and endosperm – must be present to qualify as a whole grain."

"If the grain has been ***processed*** *(e.g., cracked, crushed, rolled, extruded, and/or cooked),* ***the food product should deliver the same rich balance of nutrients*** *that are found in the original grain seed."*



Recommendation for whole grain intake

The USDA Dietary Guidelines, 2015 :
"whole grains should constitute at least half of the grains in the diet"

National Dietary Guidelines, NIN, India, 2011:
"Include whole grains, pulses and greens in the diet"

FAO food based dietary guidelines of many countries promote whole grain intake.

INTAKE OF DIFFERENT FOOD GROUPS IN URBAN AND RURAL CHENNAI - CURES

Food groups (g/d)	Urban (n= 2220) (Median)	Rural (n=6900) (Median)
Refined grains	337g/d	444g/d
Whole cereals (milled)	10g/d	3.3g/d
Millets	7g/d	3.3g/d
Pulses and legumes	53 g/d	17 g/d

Radhika et al,PHN, 2010; Narasimhan et al,IJMR 2016

CONTRIBUTION OF FOOD GROUPS [ITS GI]– CURES (N = 2220)

Public Health Nutrition: page 1 of 8 doi:10.1017/S136898001000203X

Dietary profile of urban adult population in South India in the context of chronic disease epidemiology (CURES – 68)

Ganesan Radhika, Rangaswamy M Sathya, Anbazhagan Ganesan, Raghavan Saroja, Parthasarathy Vijayalakshmi, Vasudevan Sudha and Viswanathan Mohan*
Madras Diabetes Research Foundation & Dr. Mohan's Diabetes Specialities Centre, WHO Collaborating Centre for Non-Communicable Diseases, International Diabetes Federation Centre of Education, 4 Conran Smith Road, Gopalapuram, Chennai, India

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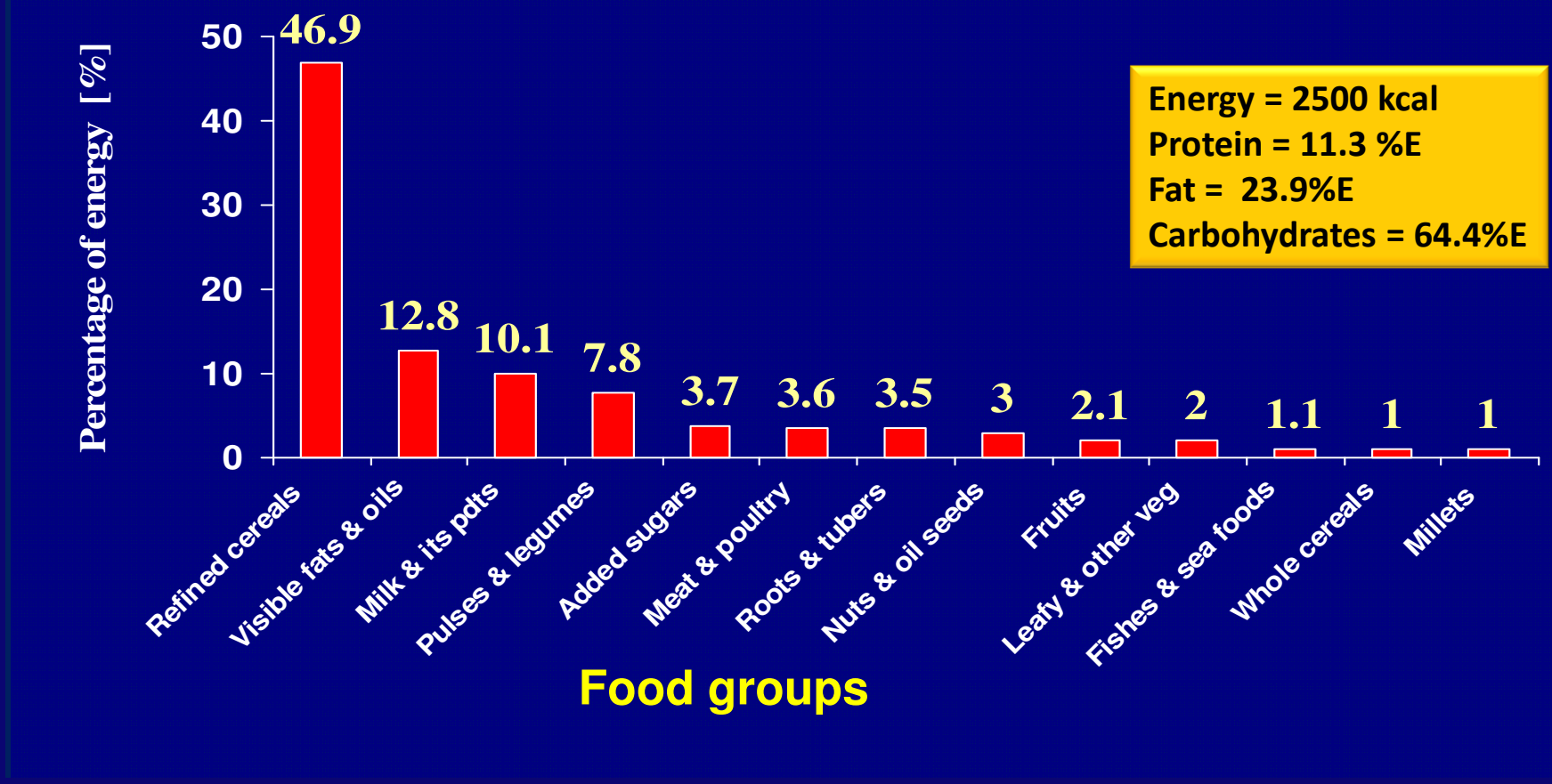


Mohan V, Radhika G, Sudha V. PHN , 2010

Glycemic Index and Glycemic load levels

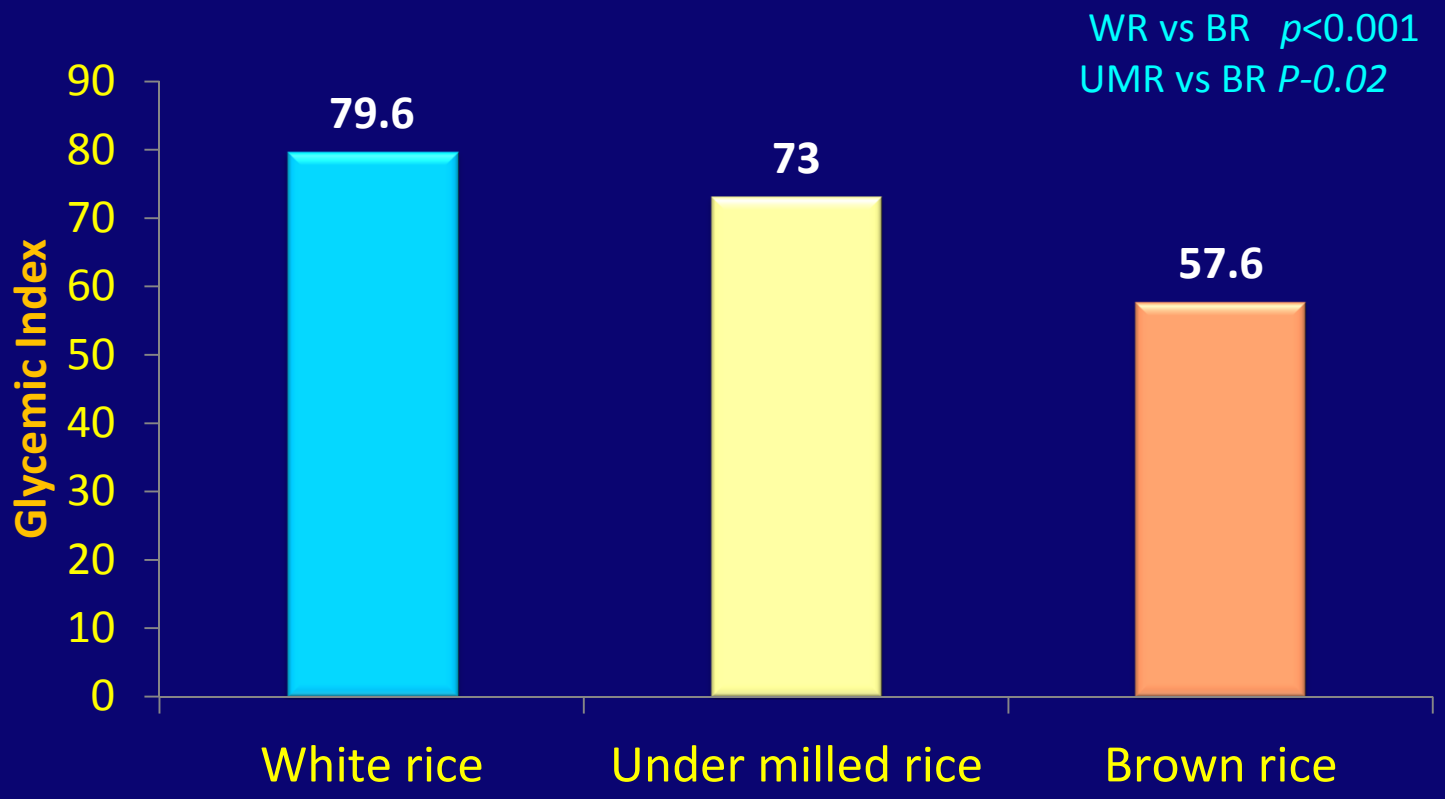
GLYCEMIC INDEX	GLYCEMIC LOAD / SERVING	GLYCEMIC LOAD / DAY
≥ 70	≥ 20	>120
56-69	11-19	80-120
≤ 55	≤ 10	< 80

	(CURES – Urban component (n = 1843)	Rural Component (n= 6900)
Women	GI 69 ± 3 GL 277 ± 86;	GI 69.3 GL 256
Men	GI 69 ± 2 GL 276 ± 89;	GI 69.2 GL 272

Source : Aeberli et al, 2007 ; Glycemic control, insulin resistance and obesity. In : Novel Ingredients of weight control, CRC press, 2007; Mohan et al, 2009, BJN, Narasimhan S et al, 2016 IJMR

PHYSIOLOGICAL PROPERTY

GI OF BROWN RICE, WHITE RICE, AND UNDER MILLED RICE FROM SINGLE RICE VARIETY (BPT 5204)- PARBOILED

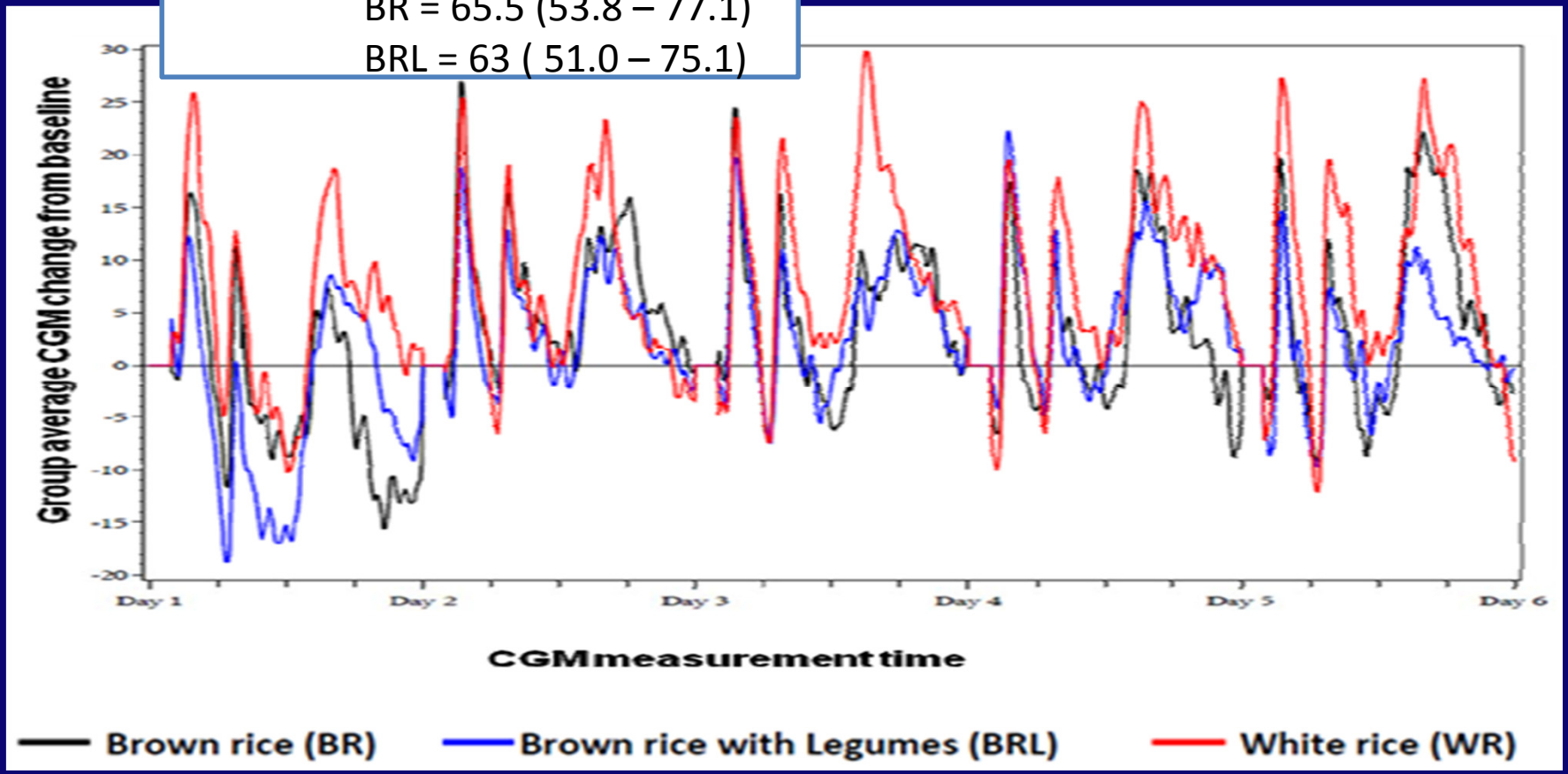


Reference food: Glucose - GI= 100

Shobana *et al, APJCN (in press)*

Average change in interstitial glucose concentrations from baseline of overweight participants fed with BR, WR and BRL (n=15)

IAUC (CI) : WR = 81.8 (61.2 – 96.3)
BR = 65.5 (53.8 – 77.1)
BRL = 63 (51.0 – 75.1)



Fasting Insulin (% change)
BR vs WR = -57%
BRL vs WR = -54%

Mohan V, Sudha V, et al. . Diabetes Technology and *Therapeutics 2013*

BROWN RICE ACCEPTABILITY

Original Research

Sudha V et al, American College of Nutrition 2011

Consumer Acceptance and Preference Study (CAPS) on Brown and Undermilled Indian Rice Varieties in Chennai, India

Vasudevan Sudha, MSc, Donna Spiegelman, ScD, Biling Hong, MS, Vasanti Malik, ScD, Clara Jones, MD, MPH, Nicole M. Wedick, ScD, Frank B. Hu, PhD, Walter Willett, MD, PhD, Mookambika Ramya Bai, MPhil, Muthu Mariyammal Ponnalagu, BSc, Kokila Arumugam, BSc, Viswanathan Mohan, MD, PhD

Madras Diabetes Research Foundation, Dr Mohan's Diabetes Specialities Centre, WHO Collaborating Centre for Non-Communicable Diseases, and International Diabetes Federation (IDF) Centre of Education, Gopalapuram, Chennai, INDIA (V.S., M.R.B., M.M.P., K.A., V.M.); Department of Biostatistics (D.S.), and Department of Epidemiology (D.S., B.H., F.B.H., W.W.), and Department of Nutrition (Va.M., N.M.W., F.B.H., W.W), Harvard School of Public Health, Boston, Massachusetts; Department of Community Health, Tufts University School of Medicine, Boston, Massachusetts (C.J.)

Key words: white rice, red rice, raw rice, parboiled rice, diabetes, obese Asian Indians

Objectives: To study consumer acceptance of unmilled brown and undermilled rice among urban south Indians.

Key findings:

Cooking quality and appearance of the grains were perceived as the most important factors to consider when purchasing rice among Chennai urban adults.

Education regarding health benefits may help this population switch to brown

BROWN RICE ACCEPTABILITY

American Dietetic Association

Kumar S, Sudha V et al, JADA 2011

RESEARCH

Qualitative Research

Perceptions about Varieties of Brown Rice: A Qualitative Study from Southern India

SHUBA KUMAR, PhD; RANI MOHANRAJ, PhD; VASUDEVAN SUDHA, MSc; NICOLE M. WEDICK, ScD; VASANTI MALIK, ScD; FRANK B. HU, PhD; DONNA SPIEGELMAN, ScD; VISWANATHAN MOHAN, MD, PhD, DSc, FRCP

ABSTRACT

Consumption of whole grains, such as brown rice, compared to white rice can decrease the risk of type 2 diabetes mellitus. This qualitative study conducted in 2009 sought to identify factors that can act as barriers to or

although convincing people to switch to brown rice would be a slow process, promoting its healthful benefits could serve to popularize it.

J Am Diet Assoc. 2011;111:1517-1522.

"Price is not very important, rice should be good…"

"Rice does not look good so it is of cheap quality…"

"It is like cow chewing food…… it is very hard…"

"Rice sits in the stomach like a stone."

Cooking time and shelf life --- barriers

OVERCOME BARRIERS TO WHOLE GRAINS CONSUMPTION

Technical Innovation

- Improvement in post harvest technologies
- Develop appropriate Germinated brown rice
- Innovation with low lipase brown rice
- Innovate intact brown rice based value added products
- Improve refined grains to mimic whole grain glycemic property

Policy Advocacy

- Promote Brown rice through PDS
- Retain taxes and subsidy for Brown rice production
- Promote rice millers with incentives on Brown rice
- Food and Nutrition labelling , functional and health claims - scientific

Community Awareness

- Health, nutrition programs at state and central levels, conferences, religious organizations, school, community, food service establishments, through media (sms/radio/TV /print/ social media- FB/whatsapp)

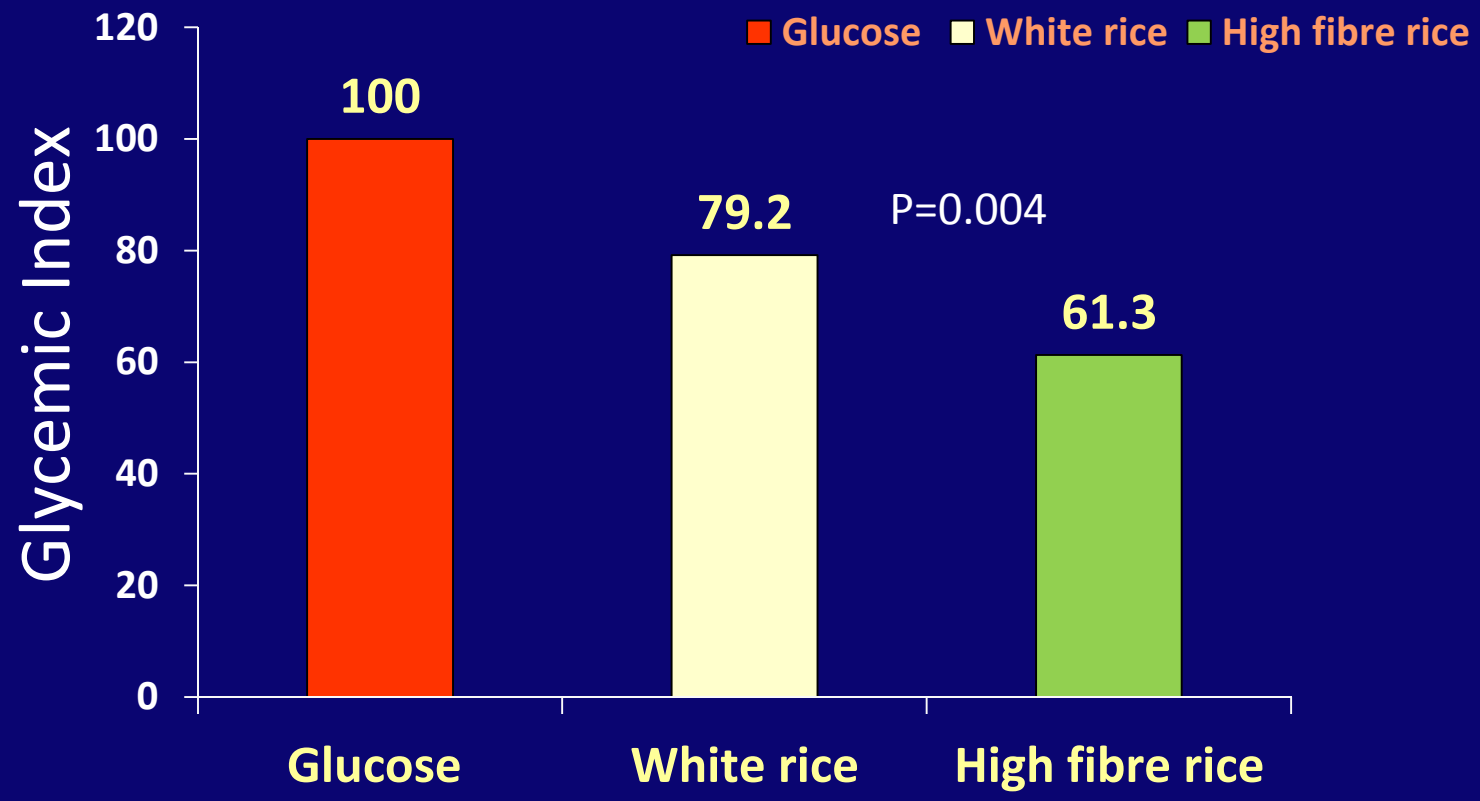
Glycemic Index of High fibre rice and white rice compared to reference glucose

ORIGINAL ARTICLE

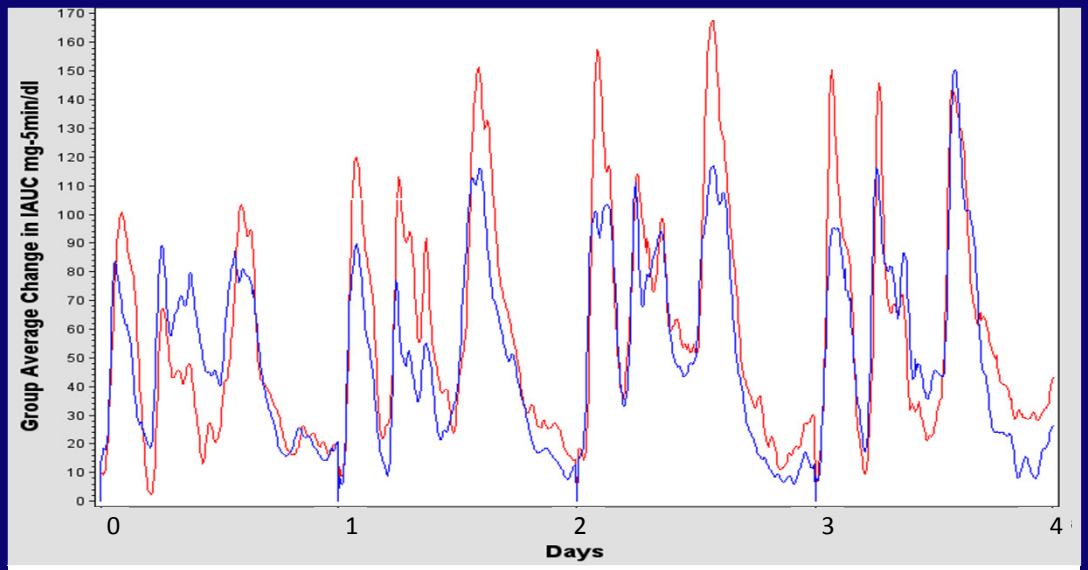
Diabetes Technology & Therapeutics 2016

Glycemic Index of a Novel High-Fiber White Rice Variety Developed in India—A Randomized Control Trial Study

Viswanathan Mohan, MD, FRCP, PhD, DSc,[1] Ranjit Mohan Anjana, PhD,[1] Rajgopal Gayathri, MSc,[2] Mookambika Ramya Bai, MPhil,[2] Nagrajan Lakshmipriya, MSc,[2] Vaidya Ruchi, PhD,[2] K.K. Balasubramaniyam, MSc,[2] M. Mohamed Jakir, MSc,[2] Shanmugam Shobana, PhD,[2] Ranjit Unnikrishnan, MD,[1] Kamala Krishnaswamy, PhD,[2] Jeya Kumar Henry, PhD,[3] and Vasudevan Sudha, MSc[2]



High fibre rice vs white rice



Anjana et al. eposter *@ ATTD, Vienna, 2014*

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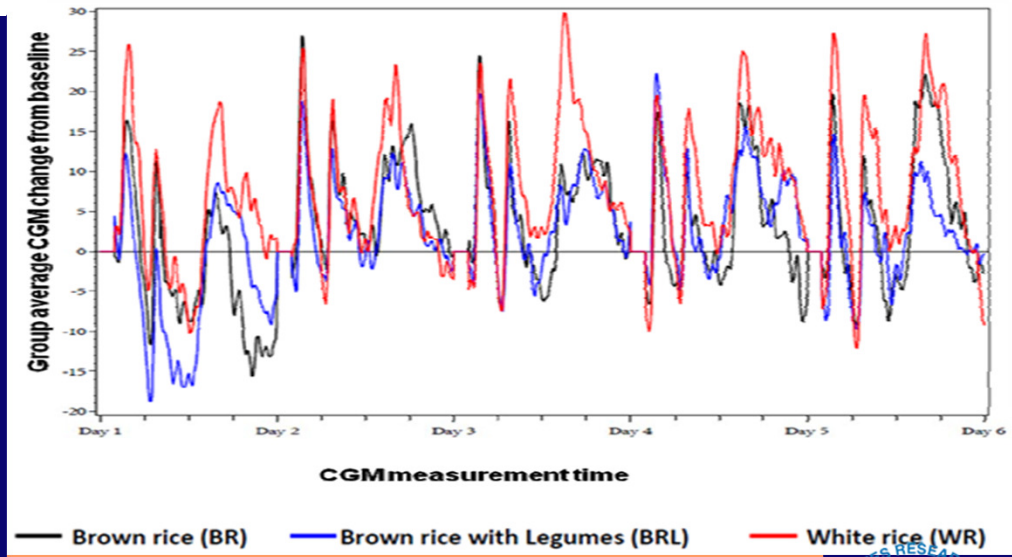
White rice vs Brown rice



Mohan V, Sudha V et al. *Diab Tech Therapeutics 2013*

20% ↓

SUMMARY

- Consumption of whole grains and millets are lower in southern states
- Glycemic property - not significantly different between White rice (refined grain) and whole grains milled (whole wheat flour based)
- The intact whole grains play an important role in prevention and management of chronic diseases

Break the barriers – Two prong approach

- Improve technology to develop intact wholegrain products or lower GI with functional ingredients for the whole grain milled products
- Educate and help consumers to break their perceptions and improve intake of wholegrains whole.

Our Team

Foods, Nutrition and Dietetics Research team

Food technology and food quality analysis team

THANK YOU