

Rice and Health:

3. Why do Asians develop diabetes despite a low BMI?

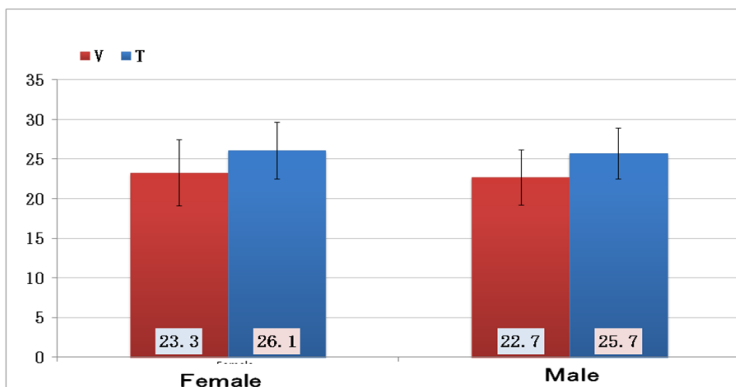
Second- and third-generation Japanese-Americans who are well acculturated in the American life-style still have higher diabetes rates compared with Caucasians, suggesting genetics is an important factor. However, Japanese dietary habits are still maintained by many Japanese-Americans. Therefore, a combination of genetics and environment are probable contributing factors.

Our first study was done in newly diagnosed Vietnamese diabetics (Duc Son le NT et al. J Am Coll Nutr. 2005 Aug;24(4):229-34). It was surprising that the BMI of DM were similar to that of normal persons and within the normal range. This indicates why Asians and Vietnamese are susceptible to diabetes.

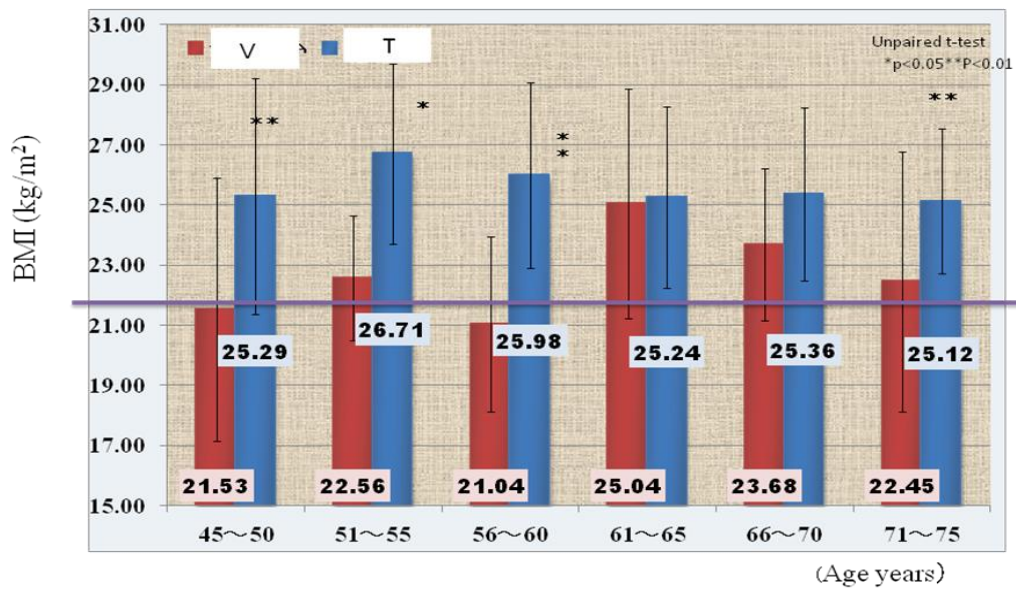
Variables	Diabetes	Control
N	50	100
BMI	22.5 ± 3.4	22.9 ± 3.7
WHR	0.91 ± 0.07*	0.86 ± 0.08
Body fat (%)	31.1 ± 5.8 [†]	27.7 ± 6.2

Next we compared the BMI of newly diagnosed Vietnamese and Taiwanese DM patients.

The BMI of Vietnamese DM was lower than that of Taiwanese both in females and males and also in the different age groups.



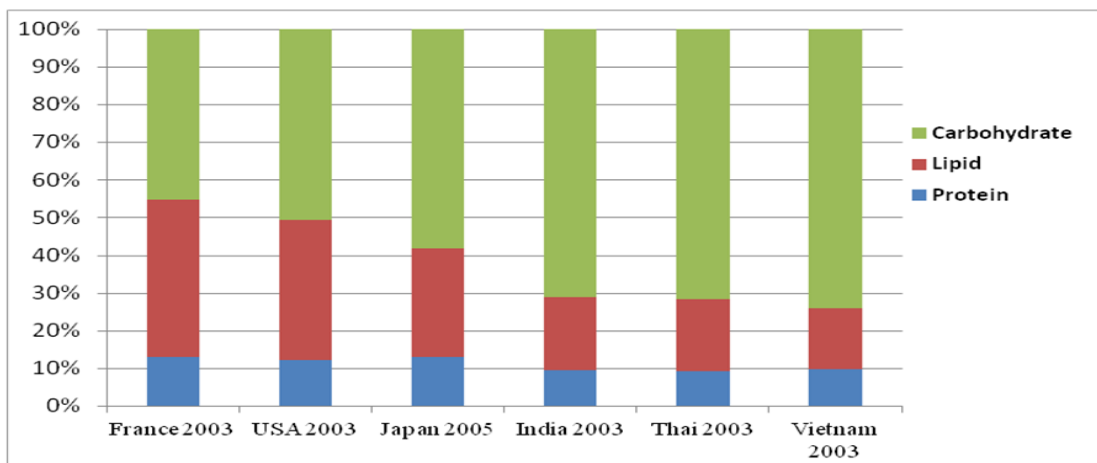
**BMI of newly diagnosed type 2 DM
In Vietnamese and Taiwanese**



BMI of newly diagnosed DM patients in Vietnam and Taiwan

3

PFC ratio of some countries



FAO [Food balance sheet] 2006

The above results may suggest that a high carbohydrate intake by Vietnamese (usually from white rice) is a factor of prevalence of DM with normal BMI.

Effect of Vietnamese common diet on postprandial blood glucose level in adult females.

Lin PY, Nhung BT, Khan NC, et al. J Nutr Sci Vitaminol 2007;53(3):247-52.

The present study was designed to elucidate the effect of a typical Vietnamese diet including a high content of white rice on postprandial blood glucose levels. Thirty healthy female subjects with similar body mass indexes, 10 each in their twenties, forties and sixties, were recruited. Four meals with a similar protein energy percentage (13-15%) but different energy ratios of fat and carbohydrate (FC ratio) and vegetable contents were provided by cross-over design.

Study design:

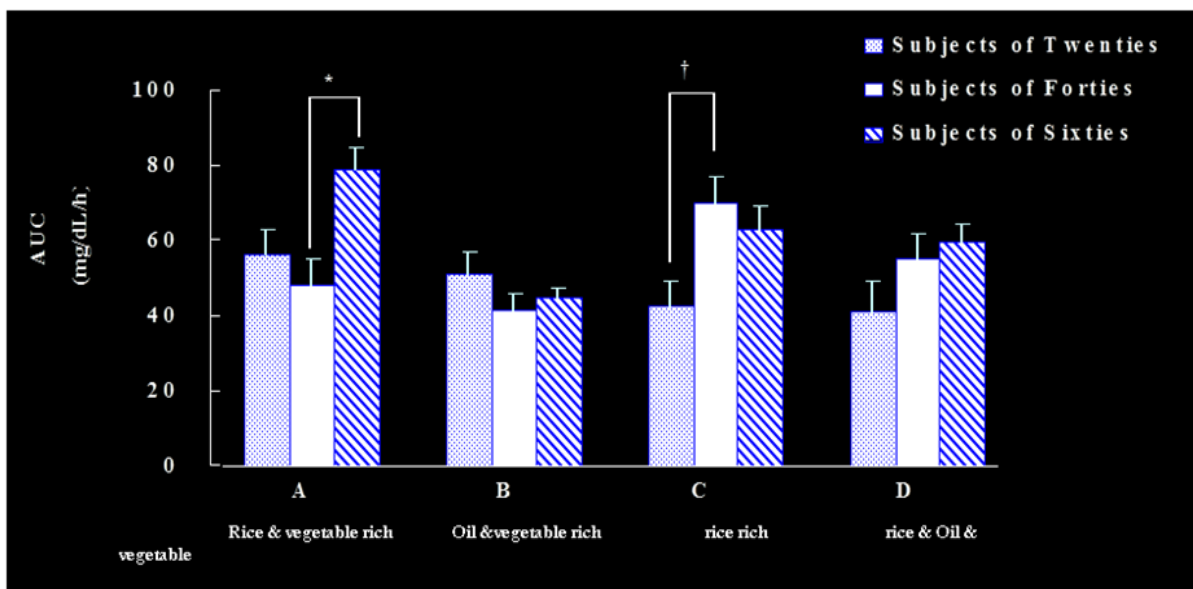
- Each subject ate 4 test meals on separate mornings with a cross-over design.
- Subjects were asked to fast for at least 10 h. before testing. . Fasting blood glucose was measured before consumption of test meals.
- Test meals were consumed within 15 min.
- Post-meal blood glucose was measured every 30 min for 2 h.

Dietary composition and PFC ratios of four test meals

	Meal A* Rice & Vegetable rich 15:14:71	Meal B Oil & Vegetable rich 13:30:57	Meal C Rice rich 14:15:71	Meal D Rice, vegetable & Oil rich 13:26:61
PFC ratio				
White Rice (g)	110	86	110	110
Oil (g)	4	13	4	13
Pork (g)	40	40	40	40
Vegetable (g; cabbage)	100	100	0	100
Fish sauce (g)	5	5	5	5
Protein (g)	18.4	16.5	16.6	18.4
Fat (g)	7.9	16.7	7.9	16.9
Carbohydrate (g)	89.2	70.9	83.8	89.2
Fiber (g)	2	1.9	0.4	2
Total energy (MJ)	2.1	2.1	2	2.4

*Meal A was designed to be a Vietnam common diet. (1 kcal = 4.186 kJ)

30 healthy female subjects with similar BMI



Effect of various PFC meals and the comparison of Postprandial glycaemic responses (AUCs) among the three age groups. * $p < 0.01$, † $p < 0.05$.

Young subjects could maintain the constant blood glucose levels among different dietary treatments but by aging blood glucose levels were more affected by dietary PFC.

In conclusion, too much white rice is not favorable for the control of the blood glucose level, especially for middle and old age persons, however, white rice together with other foods may alleviate the problem.