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ベトナム人の食物繊維摂取量に関する研究

RESEARCH ON  
VIETNAMESE DIETARY FIBER INTAKE

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## SUMMARY IN ENGLISH

**Background:** Currently, non-communicable diseases (NCDs) are increasing rapidly around the world, including Vietnam. A high-fiber diet can reduce the risk of developing some NCDs such as coronary heart disease, stroke and type 2 diabetes. As part of my master's degree research, I found that the fiber intake of Vietnamese adults with type 2 diabetes was very low. Through 3 months of dietary fiber-focused nutritional counseling, patients were able to increase their fiber intake and their high blood glucose levels improved. However, fiber intake still did not meet the recommendation. To increase fiber intake, it is very important to create the habit of consuming more fiber in childhood, as early dietary habits and preferences often persist into adulthood. In my Ph.D. studies, I focused on comparing the fiber intake of children in Vietnam and Japan (Study 1), developing delicious Vietnamese high-fiber foods (Study 2), and investigating the possibility that problems in food composition tables may contribute to the low dietary fiber intake of the Vietnamese population (Study 3).

### **Study 1: Comparison of Vietnamese and Japanese Children's Fiber Intake**

**Methods:** A dietary survey was conducted by 24-hour recall method at a primary school in a suburb of Hanoi, Vietnam on 3 non-consecutive days (2 school days and 1 weekend day) and in certain city in central Japan on 2 non-consecutive days (1 school day and 1 weekend day). The subjects were 10-year-old children, 21 boys, 15 girls in Vietnam and 35 boys, 30 girls in Japan.

**Results and conclusion:** The dietary fiber intake (g) of children in Vietnam and Japan was  $4.9 \pm 4.2$  and  $11.9 \pm 4.8$  ( $p < 0.001$ ) for boys and  $4.1 \pm 2.4$  and  $12.6 \pm 4.3$  ( $p < 0.001$ ) for girls, respectively. These results suggested that the introduction of tasty, high-fiber foods is necessary in Vietnam.

## **Study 2: Study on the Acceptance of High-Fiber Foods among Vietnamese People**

**Methods:** We compared dishes with and without Okara, Konjac, Mushrooms, and Texturized Soy Protein (TSP). Pre-Germinated Brown Rice (PGBR) was compared using 50, 60, 75, 85, and 100% PGBR in the staple food rice. Taste and preference evaluations were conducted by students from Hanoi Medical University (20 for each food, 100 in total) through hedonic rating 5-point scale scorecard and food action rating test score card.

**Results and conclusion:** For Okara, Konjac and Mushroom dishes, the sensory test results were similar to the paired normal dishes and about 80% of the participants agreed that they would like to eat these dishes. For the TSP dishes, the rating was significantly lower than the normal dishes except for texture, but still 75% of the participants agreed that they would like to eat these dishes. For PGBR dishes, 50% PGBR and 60% PGBR mixture was high evaluated. These results suggested that okara, konjac, mushroom and PGBR can be integrated into Vietnamese dishes and increase the fiber intake of the Vietnamese. In addition, suitable preparation methods for TSP need to be found to make them tastier and easier to eat.

## **Study 3: Comparison of Nutrient Intake in Vietnamese Children as Calculated by Three Different Food Composition Tables**

**Methods:** The results of the dietary survey of Vietnamese children in Study 1 were calculated for dietary fiber intake and energy/nutrient intake using food composition tables (FCT) from Vietnam, Japan, and Thailand.

**Results and conclusion:** When using the Vietnamese FCT, the dietary fiber intake was significantly lower compared to when using the FCT from Japan and Thailand. This difference was attributed to variations in the methods of measuring dietary fiber content among these three countries. However, there were no significant differences observed in energy, protein, fat, and carbohydrate intake. It became evident that revising the measurement method for dietary fiber in the Vietnamese FCT is necessary.

## SUMMARY IN JAPANESE

**背景：** 現在、ベトナムでも生活習慣病が急増している。食物繊維の多い食事は、冠動脈性心疾患、脳卒中、2型糖尿病などの生活習慣病発症リスクを減らす可能性がある。修士課程の研究では、ベトナム人2型糖尿病患者の食物繊維摂取量が非常に少なかったため、食物繊維増加に焦点を当てた栄養指導を3か月間行った結果、高血糖値が改善した。しかし十分な食物繊維摂取は容易ではなく推奨量を満たすことができなかった。幼少期の食習慣や好みは成人してからも残ることが多いことから、子供のうちに繊維の多い食習慣を養うことが大切である。博士課程では、児童の食物繊維摂取量の日越比較（研究1）、食物繊維の多く美味しいベトナム料理の開発（研究2）、ベトナム人の食物繊維摂取量の低い原因として食品成分表に問題があるのではないかとこの疑問が湧いたため、これを明らかにするために研究3を実施した。

### 研究1：ベトナムと日本児童の食物繊維摂取量の比較

**方法：**ベトナムではハノイ市郊外の某小学校で非連続3日間（平日2日、休日1日）、日本では中部の某市の小学校で非連続2日間（平日1日、休日1日）、24時間思い出し法で食事調査を行った。対象者は10歳児で、ベトナムでは男子21名、女子15名、日本では男子35名、女子30名であった。

**結果と結論：**ベトナムと日本児童の食物繊維摂取量(g)は、それぞれ男子で $4.9 \pm 4.2$ 、 $11.9 \pm 4.8$  ( $p < 0.001$ )、女子で $4.1 \pm 2.4$ 、 $12.6 \pm 4.3$  ( $p < 0.001$ )であった。ベトナムでは、食物繊維の多い美味しい料理の導入が必要であることが示唆された。

## 研究2：ベトナム人に好まれる食物繊維の多い料理の開発研究

**方法：**食物繊維の多い、おから、こんにゃく、キノコ、大豆ミートの有無の料理を比較した。発芽玄米は、主食のコメのうちで発芽玄米の割合を50、60、75、85、100%として比較した。味と好みの評価は、ハノイ医科大学学生で（各料理20名、合計100名）で5段階評価の官能評価と食品受容性調査のアンケートを行った。

**結果と結論：**おから、こんにゃく、キノコ料理の官能評価の結果は通常の料理とほぼ同じ、被験者の約80%がこれから日常的に食べたいと回答した。大豆ミート料理は、食感以外は通常の料理よりも評価が低い、それでも被験者の約75%がこれから日常的に食べたいと回答した。発芽玄米は、主食のコメの50%と60%が高く評価された。以上の結果は、おから、こんにゃく、キノコ、発芽玄米は、味覚を損なわず食物繊維摂取量を増すことができることが示唆された。大豆ミートは、調理法の改善が必要であることが分かった。

## 研究3：ベトナム、日本およびタイの食品成分表の比較検討

**方法：**研究1のベトナム児童の食事調査の結果を、ベトナム、日本、タイの食品成分表を用いて食物繊維摂取量とエネルギー・栄養素の摂取量を計算した。

**結果と結論：**ベトナム成分表を用いた場合、日本やタイの成分表を用いたときよりも、食物繊維摂取量が著しく少なかった。この原因は、これら3ヶ国の食物繊維含有量の測定方法の違いであった。エネルギー、たんぱく質、脂質、炭水化物には差がなかった。ベトナム食品成分表の食物繊維の測定方法を改訂することが必要であることが明らかになった。

# STUDY 1: COMPARISON OF VIETNAMESE AND JAPANESE CHILDREN'S FIBER INTAKE



## INTRODUCTION

Fiber is a crucial component of a healthy diet, which is essential for maintaining overall well-being and preventing various health condition

The definition of fiber varies across different countries and organizations around the world. For instance, the Japanese Association for Dietary Fiber Research (2000) defines dietary fiber as dietary components which are not digested and/or absorbed in the human small intestine and which exert physiological effect that are useful in maintaining good health via the gastrointestinal tract (1). Meanwhile, the American Association of Cereal Chemists Expert Committee (2001) defines “Dietary fiber as the edible parts of plants or analogous carbohydrates that are resistant to digestion and absorption in the human small intestine with complete or partial fermentation in the large intestine. Dietary fiber includes polysaccharides, oligosaccharides, lignin, and associated plant substances. Dietary fibers promote beneficial physiological effects including laxation, and/or blood cholesterol attenuation, and/or blood glucose attenuation.” (2). The Food Nutrition Board of the Institute of Medicine of the National Academies (2002) defines, “Dietary fiber consists of non-digestible carbohydrates and lignin that are intrinsic and intact in plants” (3). According to the CODEX Alimentarius Commission, dietary fiber means carbohydrate polymers with ten or more monomeric units, which are not hydrolyzed by the endogenous enzymes in the small intestine of humans; however, the decision on whether to include carbohydrates from 3 to 9 monomeric units should be left to national authorities (4).

Regardless of the varying definitions, dietary fiber provides numerous benefits for both digestive health and overall well-being. One of the primary functions of fiber is to promote regular bowel movements and prevent constipation (5). It adds bulk to the stool, making it easier to pass through the intestines. By facilitating regularity, fiber helps prevent digestive issues such as hemorrhoids and diverticulosis. In addition to its impact on digestion, fiber also plays a significant role in regulating blood sugar levels in the patients with type 2 diabetes



mellitus (6). Soluble fiber, found in foods such as oats, legumes, and fruits, forms a gel-like substance in the digestive tract. This gel slows down the absorption of glucose into the bloodstream, preventing rapid spikes in blood sugar levels. Consequently, a diet rich in fiber can reduce the risk of developing type 2 diabetes and help manage blood sugar levels in individuals with diabetes. Furthermore, fiber aids in weight management (7). High-fiber foods tend to be more filling and satisfying, leading to a reduced calorie intake. Additionally, fiber-rich foods require more chewing, which promotes a slower eating pace and allows for better recognition of satiety cues. By promoting feelings of fullness, fiber can help control appetite and prevent overeating. Beyond its impact on digestion and weight management, fiber also plays a significant role in maintaining heart health (8). Soluble fiber helps lower cholesterol levels by binding to cholesterol in the digestive system and preventing its absorption into the bloodstream. By reducing LDL cholesterol levels, fiber helps protect against cardiovascular diseases such as heart attacks and strokes. Lastly, fiber acts as a prebiotic, providing nourishment for beneficial gut bacteria (9). These bacteria play a crucial role in maintaining a healthy gut microbiome, which is essential for proper digestion, nutrient absorption, and immune function. By promoting the growth of beneficial bacteria, fiber supports a balanced gut microbiota and contributes to overall gut health.

Fiber intake recommendations also vary across countries. The UK government recommends a fiber intake of 18 g/day (10). This recommendation is equivalent to 10 g of dietary fiber per 1000 Kcal. In Japan, the Ministry of Health recommends a dietary fiber intake to prevent lifestyle-related diseases for men aged 18 - 64 of 21 g/day and for women aged 18 - 64 of 18 g/day (11). In the US, the recommended total fiber intake is 34 g/day for men aged 19-30 and 28 g/day for women aged 19-30 (12). This recommendation is equivalent to a total fiber intake of 14 g/1000 Kcal. In Vietnam, there is currently no specific dietary fiber recommendation for different age groups or genders. The National Institute of Nutrition provides a minimum recommended fiber intake of 20-22 grams per day (13).

Despite being aware of the benefits of fiber, Vietnamese people still consume very little fiber in their diets (14, 15). One reason for the low consumption of fiber in Vietnam may be due to dietary habits. While Vietnam is a tropical country and can grow and harvest various kind of vegetables, people do not have a habit of consuming a lot of vegetables. Meals tend to emphasize white rice and meat-based dishes. This could be one of the reasons for the occurrence of non-communicable diseases (NCDs).



Photo 1: Vietnamese meals

NCDs are increasing rapidly around the world, including Vietnam. To take diabetes as an example, according to the World Health Organization, globally, in 2014 there were about 422 million people with diabetes; in 2016, an estimated 1.6 million deaths were directly caused by diabetes and another 2.2 million deaths were attributable to high blood glucose in 2012 (16). In Vietnam, the prevalence of diabetes is growing at alarming rates and has almost doubled within the past 10 years. In 2002, the proportion was 2.7%, but by 2012, it was up to 5.4% (17). In 2015, it was estimated that 5.6% of people had diabetes and about 53,458 deaths were attributed to diabetes (18). The diabetes-related expenditures in Vietnam are on average 163 USD per patient per year, more than the average monthly salary of 150 USD in Vietnam (19).

To address this issue, it is important to promote the consumption of high-fiber foods as part of a healthy diet. Nutrition education can help individuals understand the importance of fiber in their diets and encourage the consumption of fiber-rich foods. However, there are various barriers for patients to obtaining the proper nutrition education. These include lack of dietitians, lack of time for dietitians to provide patients with continuing education and sometimes lack of patients' access to dietitians because patients do not have the time or money to come to the hospital. Therefore, we conducted a study to determine the effect of fiber-focused nutrition counseling through nutrition software on improving HbA1c of Vietnamese type 2 diabetes mellitus (T2DM) patients. Sixty outpatients with T2DM were recruited at a hospital for a 3-month randomized controlled trial study. We formed 30 pairs matched by HbA1c, sex, age, BMI, and years of diabetes, and divided them randomly into an Intervention and a Control group. Both groups were instructed to use the nutrition software. All the nutrition surveys and nutrition counseling were carried out using software. The Control group had a 3-consecutive-day nutrition survey at baseline and final and received 1-time nutrition counseling at baseline. The Intervention group had a 3-consecutive-day nutrition survey and counseling 5 times. The counseling was focused on increasing fiber intake from vegetables and fruits. The target was 2 bowls of vegetables/meal; the appropriate amount of fruit/day. In addition, subjects

were also counseled about food choices. At baseline and final, anthropometric measurements and blood withdrawal were conducted. After 3 months, the intervention group had increased vegetable intake (from  $234.4 \pm 129.9$  to  $326.2 \pm 173.2$  g/day,  $p < 0.05$ ), and fiber intake (from  $6.4 \pm 2.5$  to  $8.3 \pm 3.0$  g/day,  $p < 0.0001$ ), while the control group had no change. Moreover, the variety of vegetables also increased. At baseline, almost all intervention patients ate just one kind of vegetable at many meals. This may have made them lose their appetite and they did not want to eat more vegetables. We tried to tell them to choose seasonal vegetables and combine various kinds of vegetable in 1 meal so the dishes would become more delicious and eye-catching. We also encouraged patients to change the kind of vegetable frequently, so they did not get bored. Hence, from 1 kind of vegetable/meal at baseline, they could change to 2-3 kinds of vegetables/meal at the end of the study. As a result, HbA1c was significantly improved in the Intervention group (from  $8.16 \pm 0.75\%$  to  $7.79 \pm 0.85\%$ ,  $p < 0.05$ ) compared with the Control group (from  $8.05 \pm 0.77\%$  to  $8.39 \pm 1.33\%$ ). There was a negative correlation between change in fiber intake and change in HbA1c.

Implementing fiber-focused nutrition counseling proved beneficial, resulting in increased fiber consumption and reduced HbA1c levels. However, despite these positive outcomes, the fiber intake was still below recommended levels. It became evident that establishing a habit of consuming adequate fiber from childhood is crucial, as early food habits and preferences tend to persist into adulthood (20) and the development of some non-communicable diseases in adults has its origins in childhood and adolescence (21). Little is known about fiber intake for Vietnamese children. Meanwhile, the Japanese population is renowned for their high-fiber diet. Therefore, in this study, we aimed to compare the fiber intake of Japanese and Vietnamese children and identify the factors that contribute to the differences. By understanding the factors that contribute to differences in dietary fiber intake, we hoped to identify effective strategies for promoting healthy eating habits among children in different countries.

## METHODS

### In Japan

A dietary survey was conducted by the 24-hour recall method at a primary school in Aichi prefecture on two non-consecutive days (1 school day and 1 weekend day). The subjects were 10-year-old children, 35 boys and 30 girls. Researchers interviewed each child using standard food measures and food models to estimate portion size. When children did not remember exactly what they had eaten, we contacted their parents to reconfirm. This study was collaborative with the school board of the city where the elementary schools are located. The Board of Education informed guardians that the research would not include the names of schools or individuals and obtained their cooperation before conducting it. The board also covered the costs necessary for the research.



Photo 1: Example of Food Model

記入例 調査日  
○月△日(□)

**食事調査用紙**

2年 3組 番 名前 ( )

1. 食事の種類	2. 料理名	3. 食品名	4. 食品使用量		5. 備考	6. 備考
			7. 全分量	8. 食事一人当たり量		
朝食 (朝1)	トースト	食パン		1枚	砂糖入り	
		イチョウワッフル		スプーン1杯	シチュー・鶏スプーン	
	コーンスープ	コーンスープ		1杯	鶏肉・ブロッコリー・コーン・トマト	
朝食 (朝2)	小麦	小麦	※この加工品、調理済食品はメーカー名、商品名を記入 ※包装に栄養成分表示があれば別紙(栄養成分表示 食品欄)に記入			
朝食2	デザート・チョコス	デザート・チョコス	1袋 (約70g)	30%	デザート・チョコス	砂糖
	マフィン・チョコス			2.3	チョコス	砂糖
						※名、メニュー名を記入 食べた目安量も記入してください
夕食	ご飯	白米		1碗(約150g)	白米	
	味噌汁	味噌汁	大さじ4			
	納豆・味噌汁	納豆・味噌汁	1.4杯	1.5		
	ポテトの揚げ物	ポテト		1杯		
	大根おろし	大根		大さじ1		
	シチュー・マイ	シチュー・マイ		1杯		
	揚げ豆腐	揚げ豆腐	大さじ1			
	エムメン	エムメン		1杯		
	納豆 (朝)	納豆 (朝)		100%		
	ポテト	ポテト		スプーン2杯		
	ポテト	ポテト		スプーン2杯		
夕食	お米	お米		1碗		
	味噌汁	味噌汁		1杯		
	納豆	納豆		1杯		
	ポテト	ポテト		1杯		

1. 家族全員分を一度に料理した場合は

「全体量」  
料理に使用した家族全員分の食料量  
の分量を記入

「児童1人当たり量」  
調査対象のお子さんが全体の何%  
あるいは、何分の1食べたかを  
記入

2. お子さんの食べた量が分からぬ場合は

「児童1人当たり量」の半量記入

※食べた分量の記入方法は別紙(食事調査用紙 記入方法)参照

Photo 2: Dietary survey form in Japan

In Vietnam

A dietary survey was conducted by the 24-hour recall method at a primary school in a suburb of Hanoi on 3 non-consecutive days (2 school days and 1 weekend day). The subjects were 10-year-old children, 21 boys and 15 girls. Researchers interviewed each child using standard food measures, a food photobook (22), using the nutrition value of 500 common dishes published by the Vietnamese National Institute of Nutrition (23) to estimate portion size. When children did not remember exactly what they had eaten, we contacted their parents to reconfirm.

The protocol had been approved by the Hanoi Medical University Institutional Ethical Review Board (approval no. 355) on Dec 18<sup>th</sup> 2020. Before we conducted the survey, all the parents and children were informed of the nature of the project, and signed a consent form.



Photo 3: Food photobook

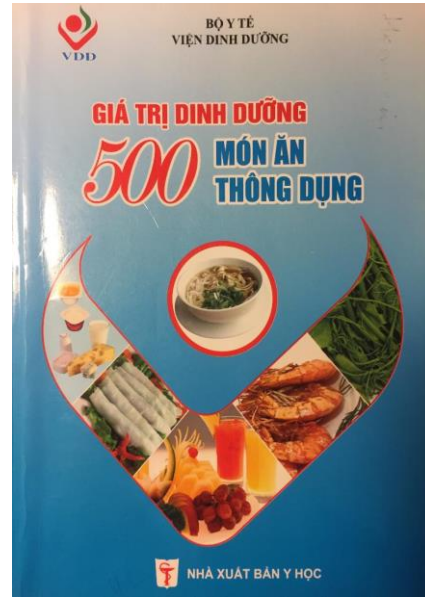


Photo 4: Nutrition value of 500 common dishes

70-518 10/2019 10/2019 10/2019 CN

Q1. Thêm quả, em có được bổ sung các thực phẩm này vào bữa ăn hàng ngày?  
 A. Có B. Không

Q2. Nếu CÓ thì số bữa ăn .....VNHD

Q3. Em dành bao nhiêu tiền cho việc mua đồ ăn và đồ uống .....VNHD

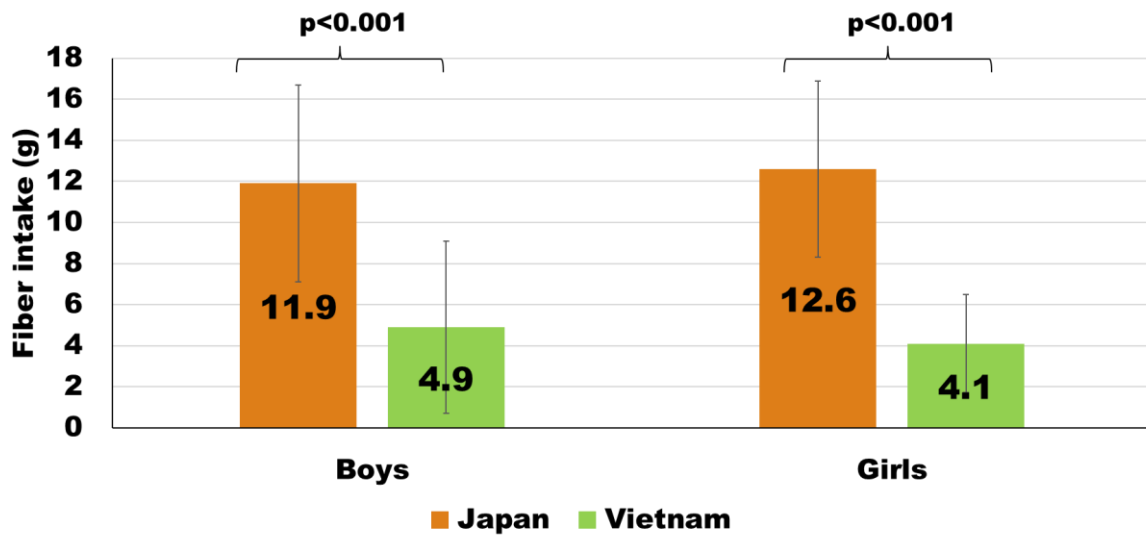
Bữa ăn	Nơi ăn	Chức vụ của người ăn	Tên món ăn và thành phần chính (nếu có thể ghi rõ tên, số lượng các thành phần)	Loại thức ăn để tương ứng (nếu có)	Số lượng (g/ml)	Đơn vị	Số bữa ăn (trong ngày)	Đơn vị
1	1	1	Phở bò	Phở bò	100g	g	1	100g
			Phở gà	Phở gà	100g	g	1	100g
			Phở heo	Phở heo	100g	g	1	100g
			Phở vịt	Phở vịt	100g	g	1	100g
3	1	1	Phở	Phở	100g	g	1	100g
			Phở	Phở	100g	g	1	100g
			Phở	Phở	100g	g	1	100g
			Phở	Phở	100g	g	1	100g
5	1	1	Phở	Phở	100g	g	1	100g
			Phở	Phở	100g	g	1	100g

Photo 5: Dietary survey form in Vietnam

Statistical analysis:

Statistical analysis was done by IBM SPSS Statistics 26. The data were expressed as mean ± SD. The differences in fiber intake of children between Japan and Vietnam were tested using Mann-Whitney U test. p-values of less than 0.05 were considered statistically significant for all the analyses.

## RESULTS



**Figure 1: Comparison of fiber intake in 10-year-old children in Japan (35 boys, 30 girls) and Vietnam (21 boys, 15 girls)**

Values are mean  $\pm$  SD

p-values were computed using Mann-Whitney U test

Figure 1 shows the comparison of dietary fiber intake in 10-year-old children in Vietnam and Japan. Overall, the dietary fiber intake of Vietnamese children was much lower than that of Japanese children. The intake of Japanese boys was about 2.5 times that of Vietnamese boys. Intake of Japanese girls was about 3 times that of Vietnamese girls.



**Table 1: Comparison of fiber intake by sources in 10-year-old children in Japan and Vietnam**

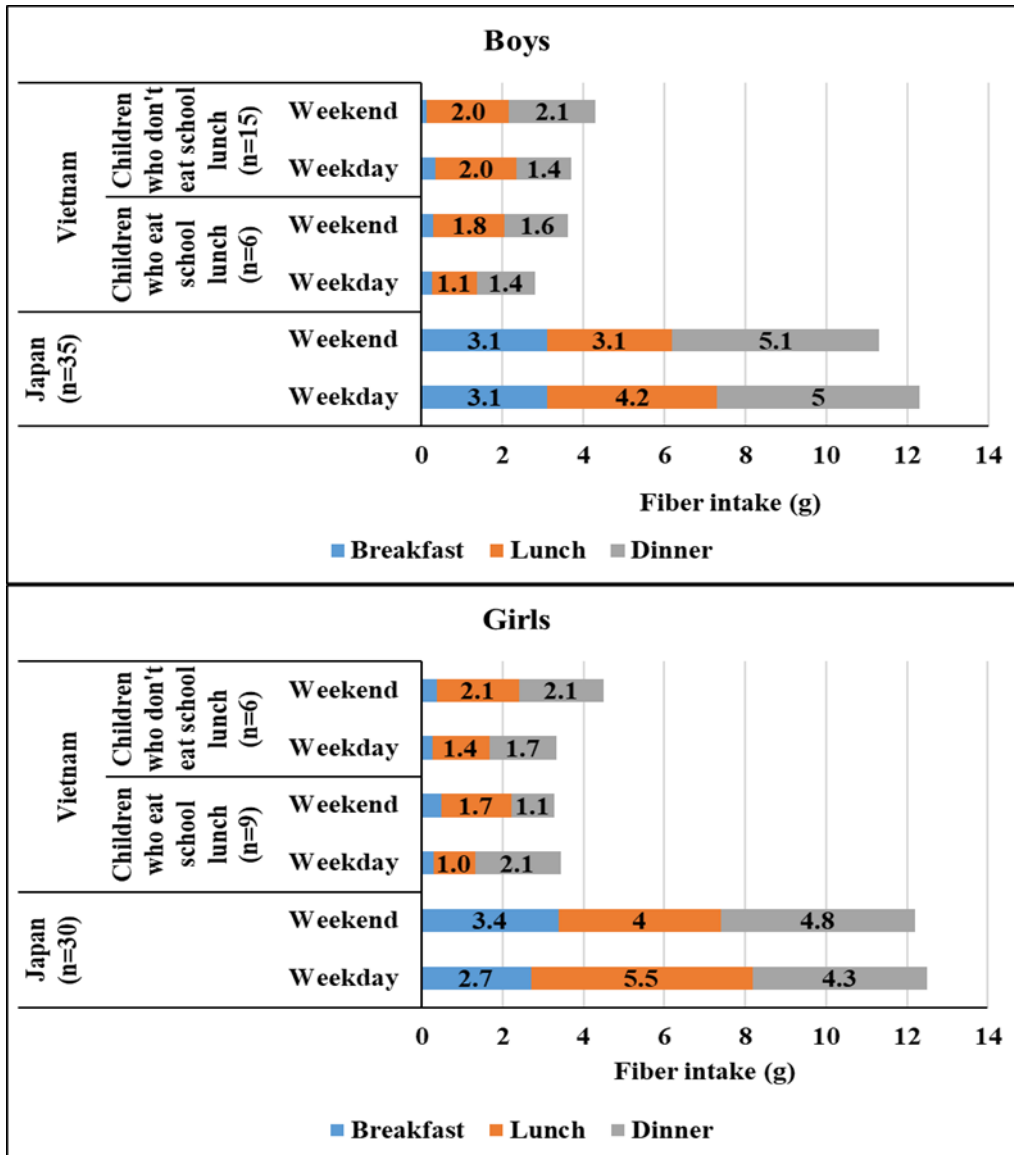
Food Group	Boy		Girl	
	Japan (n=35)	Vietnam (n=21)	Japan (n=30)	Vietnam (n=15)
Vegetables	4.1 ± 2.6	1.4 ± 0.9***	5.2 ± 3.0	1.1 ± 0.7***
Grains	3.3 ± 1.4	1.1 ± 0.3***	3.1 ± 1.5	1.1 ± 0.2***
Fruits	0.8 ± 1.0	1.3 ± 1.5***	1.1 ± 0.8	0.9 ± 0.7***
Beans	1.4 ± 2.4	0.9 ± 0.9 <sup>NS</sup>	0.5 ± 0.9	0.5 ± 0.2*
Potatoes	1.2 ± 1.5	0.1 ± 0.2***	0.9 ± 0.5	0.4 ± 1.1***
Mushrooms	0.7 ± 0.6	0 ± 0***	0.9 ± 0.7	0 ± 0***
Other	0.4 ± 0.1	0.1 ± 0.1***	0.8 ± 0.2	0.1 ± 0.1***

Values are mean ± SD (g)

\*,\*\*\* Mann-Whitney U test, significant differences at p<0.05, p<0.001 respectively

<sup>NS</sup> Mann-Whitney U test, non-significant difference

Table 1 shows the comparison of fiber sources in 10-year-old children in Japan and Vietnam. The big differences in the fiber sources were from the vegetables group and grains. While Japanese boys consumed 4.1g of fiber from vegetables and 3.3g of fiber from grains, Vietnamese boys consumed only 1.4g of fiber from vegetables and 1.1g of fiber from grains. For girls, the fiber intake from vegetables and grains were 5.2g and 3.1g in Japan and 1.1g and 1.1g in Vietnam, respectively.



**Figure 2: Comparison of fiber intake by meal and day in 10-year-old children in Japan and Vietnam**

Figure 2 shows the comparison of fiber intake by meal and day in 10-year-old children in Japan and Vietnam. In Japan, all children eat lunch at school, so they belong to one group. In Vietnam, school lunch is voluntary, so children are divided into 2 group: children who eat school lunch and children who don't eat school lunch. In Japan, overall consumption is high, but it was higher on weekdays than on weekends. The main difference is in lunch intake. In contrary, in Vietnam, intake on weekends was higher than on weekdays. In addition, intake of fiber from school lunches was very low.

## DISCUSSION

In this study, fiber intake of 10-year-old Vietnamese children was found to be much lower than that of 10-year-old Japanese children. The main differences in fiber sources were in the vegetable and grain groups.

In Japan, good eating habits are emphasized and established from an early age. Many efforts are made to help children eat more fiber, not only at home but also at school. Fiber intake was high both at home and at school, but fiber intake was higher at school lunch than at home lunch. School meals were offered more in the amount and variety of vegetables per meal than at home. Schools provide school lunches that are carefully calculated in many ways. Nutrition teachers try to help students eat lots of vegetables in a variety of ways, such as creating delicious and nutritionally balanced menus that include locally grown and seasonal foods and working with classroom teachers to provide nutrition education. The chefs cook wholeheartedly to prepare tasty meals. Farmers are always paying attention to the weather and work hard every day to grow more delicious vegetables and fruits. The children are taught that everyone works hard to prepare a delicious meal, so they respect the food and always try to finish their meal. After learning all about it at school, the children pass this knowledge on to their family members and also ask their parents to cook more balanced meals. The Japanese government has also helped to ensure that children eat high-fiber meals by enacting a nutrition education law (24) and a school lunch law (25, 26) that require school lunches to contain 5 grams of fiber. In this sense, school lunch contributes to improving diet quality for children.

On the other hand, Vietnam lacks efforts to increase fiber in children's diets. Children do not have the habit of eating a lot of fiber. They prefer to eat meat rather than vegetables. At home, parents pay more attention to the main dish than the vegetable dish. At school, there is no dietitian to prepare a tasty and balanced menu. School meals are prepared according to the experience of the cooks (27). Almost all schools use one- or two- week cycle menus, and the meals are monotonous and not very tasty, so children waste a lot of food, especially vegetables.

Increasing the variety of vegetables consumed regularly could be an important area to target for improvement in diet quality.

School lunches are a great opportunity to teach children healthy eating habits. The actual lunch period can be used as a "living theme with educational material on the menu" to encourage proper eating habits. At the same time, what the children learn at school becomes an exciting topic of conversation in the family, and they will pass on their messages and habits to their parents. The parent-child relationship is a bidirectional relationship that influences both health development and habit formation (28). Not only do parents' knowledge, attitudes, and practices influence their children, but children's knowledge, attitudes, and practices influence their parents.

Children need to develop the habit of eating a lot of fiber to promote their overall health and well-being. To achieve this, parents, teachers and the government need to work together to find good strategies. Parents need to know about the effects of a high-fiber diet and make an effort to prepare delicious meals. Schools need to educate children about fiber and provide delicious lunches to get children interested and pass the information on to families. The government must publish guidelines and regulations for school meals to ensure that children receive tasty, hygienic, and nutritious meals.

In addition, to increase the intake of dietary fiber, we can use high-fiber foods along with vegetables, as is the practice in Japan. While the Japanese use many high fiber foods such as okara and pre-germinated brown rice, konjac, burdock root, etc., the Vietnamese rarely use these kinds of food. This might be a good way to increase fiber intake without having to eat too much.

## **CONCLUSION**

Vietnamese children consumed much less fiber than Japanese children. The intake of fiber through school meals was also very low in Vietnam. Vietnam needs to learn from Japan how to increase children's fiber consumption, for example, by improving school meals or using high fiber food.

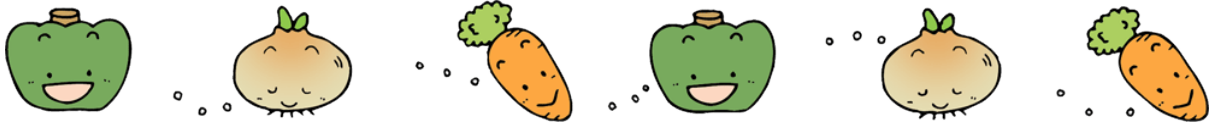
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**STUDY 2: STUDY ON THE  
ACCEPTANCE OF  
HIGH-FIBER FOODS AMONG  
VIETNAMESE PEOPLE**



## INTRODUCTION

The dietary fiber intake of Vietnamese is very low in both adults and children (1-4). In Vietnam, the main source of fiber is vegetable. While Vietnam is a tropical country, can grow and harvest various kind of vegetables, people do not have a habit of consuming a lot of vegetables. One of the reasons might be because of unattractive cooking methods. Now the question is how to improve the fiber intake of Vietnamese people. Vegetable alone cannot supply sufficient fiber and people cannot eat a large amount of vegetable every day. The idea for the solution is to use fiber-rich foods in the same way that Japan has been applying.

In Japan, people use lots of fiber-rich foods such as okara, konjac, mushroom, pre-germinated brown rice, and textured soy protein. They combine these foods with vegetables and cook them into very attractive dishes which are preferred much. These foods can be produced in Vietnam, but are rarely used.

Okara is fibrous residue after soymilk production, contains 11.5g dietary fiber per 100g (5). While in Japan, okara is consumed regularly, in Vietnam, it is often discarded or become animal feed.

Konjac is a processed food made from glucomannan in the bulb of the konjac plant, solidifies into jelly. It contains 3g of dietary fiber per 100g (5). Vietnamese people rarely use konjac, but in Japan, they are very popular, and often used in dishes such as Oden, Sukiyaki.

Mushroom can be produced a lot in Vietnam but they are rarely used, on the contrary, Japan uses a lot of mushroom in their daily meal

Pre-germinated brown rice (PGBR) has recently been widely served in Japan because of its abundant nutrition. PGBR has been developed to enhance the nutritional value of brown rice, manufactured by soaking brown rice in water to induce slight germination. It has texture and taste closer to white rice but includes substantially higher content of dietary fiber (3g/100g) (5). However, in Vietnamese meal, it rarely appears.

Soybeans have been familiar to Japanese people for a long time and the foods made from

soy are indispensable in their daily meals. A textured soy protein (TSP) is made from soybean, close to meat, such as beef, pork and chicken, but contains more fiber than meat.

These are just some of many examples of how Japanese people use fiber-rich foods as well as their diverse cooking methods to increase their fiber intake. For this reason, I would like to study Japanese ingredients, dishes and also the cooking method, arrange them in Vietnamese style, then publish a guide book to introduce to Vietnamese people to increase the fiber intake. The purpose of this study was to evaluate Vietnamese people perception of high-fiber dishes (Konjac, Okara, Mushroom, TSP, and PGBR).

## METHODS

### 1. Participants: 100 students from Hanoi Medical University.

Inclusion criteria	Exclusion criteria
- Healthy - Interested in this study and willingness to participate	- Bias to any food product - Has any dietary restrictions - Allergic to any food products

Participants were recruited by the use of fliers and class announcements.

### 2. Procedure:

#### **Step 1: Made menu**

- ✧ dish with Okara and without Okara (Same recipe): 5 recipes
- ✧ dish with Konjac and without Konjac (Same recipe): 5 recipes
- ✧ dish with Mushroom and without Mushroom (Same recipe): 5 recipes
- ✧ dish with TSP and without TSP (Same recipe): 5 recipes
- ✧ dish with PGBR: mix PGBR with white rice with different ratio: 5 recipes

#### **Step 2: Conducted a small sensory test on 10 people to modify the menu:**



**Step 3: Conducted the main sensory test:**

For Okara, Konjac, Mushroom and TSP, high-fiber dishes and paired normal dishes were compared.

PGBR was compared using 50, 60, 75, 85, and 100% PGBR in the staple food rice.

Taste and preference evaluations were conducted by students (20 for each food, 100 in total) through hedonic rating 5-point scale scorecard and food action rating test score card.



Photo 1: Preparing food



Photo 2: Explain for the participant about today's food



Photo 3: Participants eating the food and answer the questionnaire



Photo 4: Example of Okara dish (left) and normal dish (right) (Same recipe)



Photo 5: Example of Konjac dish (left) and normal dish (right) (Same recipe)



Photo 6: Example of Mushroom dish (left) and normal dish (right) (Same recipe)



Photo 7: Example of TSP dish (left) and normal dish (right) (Same recipe)



Photo 8: PGBR with mix with white rice with different ratio

From left to right, up to down, the ratio of PGBR is 50%, 60%, 75%, 85%, 100%

**Scorecard – Hedonic Rating Scale**

Dish number:.....

Name:.....

In front of you is a coded sample. Taste the sample and tick  $\surd$  how much you like or dislike it. You can taste the sample more than once.

	Appearance	Taste	Smell	Texture	Overall
Like a lot (5)					
Like a little (4)					
Neither like nor dislike (3)					
Dislike a little (2)					
Dislike a lot (1)					

Comments:.....

.....

*Figure 1: Scorecard used for Hedonic Rating Test*

**Scorecard – Food Action Rating Test**

Dish number:.....

Name:.....

You are presented with a food sample.  
Please taste the sample and tick  $\surd$  the box that best describes how you feel about it/

- I would eat this every opportunity that I had
- I would eat this very often
- I like this and would eat it now and then
- I would eat this if available but would not go out of my way
- I don't like this but would eat it on occasion
- I would hardly ever eat this
- I would eat this only forced to.

*Figure 2: Scorecard used for Food Action Rating Test*



### **3. Statistical analysis**

Statistical analysis was done by IBM SPSS Statistics 26. The data were expressed as mean  $\pm$  SD or %. The study analyses involved comparisons between the high-fiber dishes and the paired normal dishes. Differences were assessed using paired Student *t*-test. p-values of less than 0.05 were considered statistically significant for all the analyses.

## RESULTS

### 1. Okara dishes

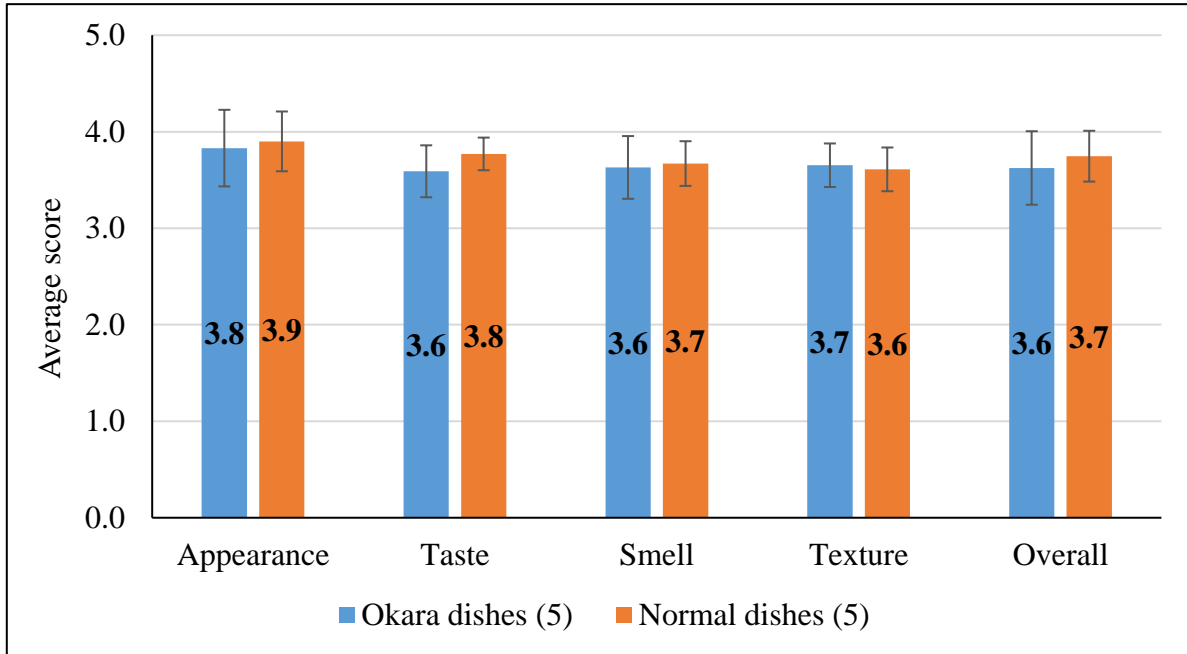


Figure 1: The average score of 20 people on the sensory test of 5 okara dishes and 5 paired normal dishes

All values are mean  $\pm$  SD. All the data were no significant differences at  $p > 0.05$  by paired Student *t*-test

Figure 1 shows the average score of 20 people on the sensory test of 5 okara dishes and 5 paired normal dishes. The score of okara dishes and paired normal dishes were almost the same in all aspects.

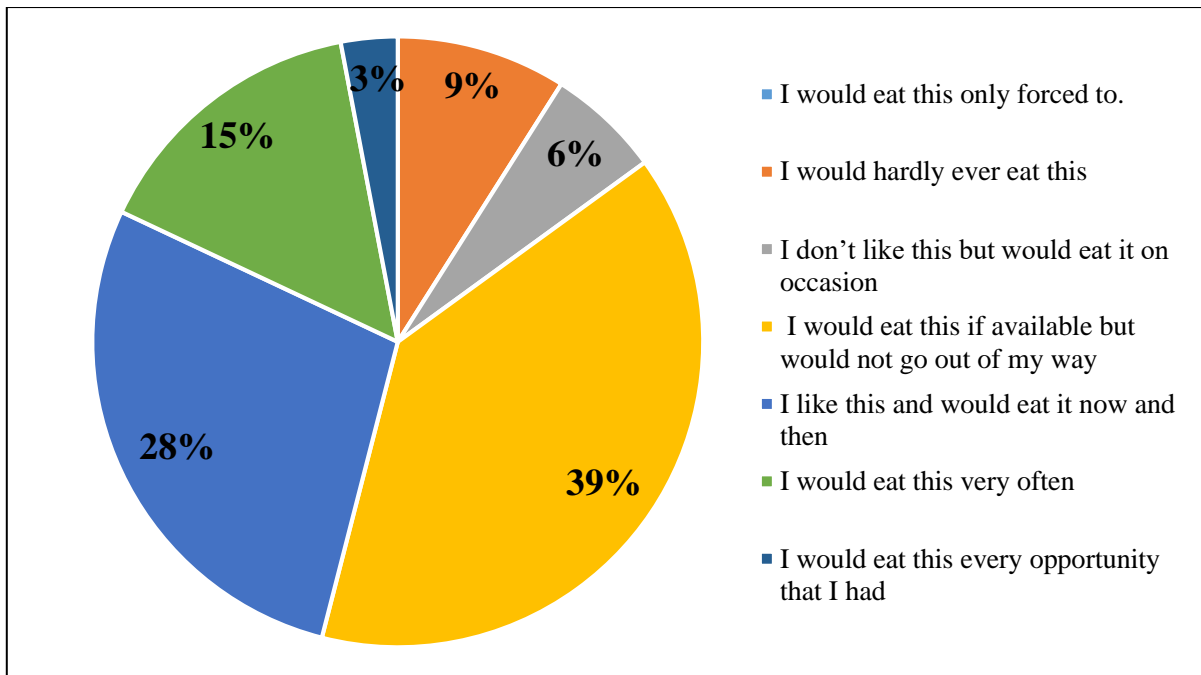


Figure 2: Percent of rating of the food action rating test of okara dishes

Figure 2 shows the percent of rating of the food action rating test of okara dishes. 39% of the participants agreed that they would eat this if available but would not go out of their way, 28% said they like this and would eat it now and then, while 15% indicated that they would eat this very often and 3% would eat this every opportunity that they had.

## 2. Konjac dishes

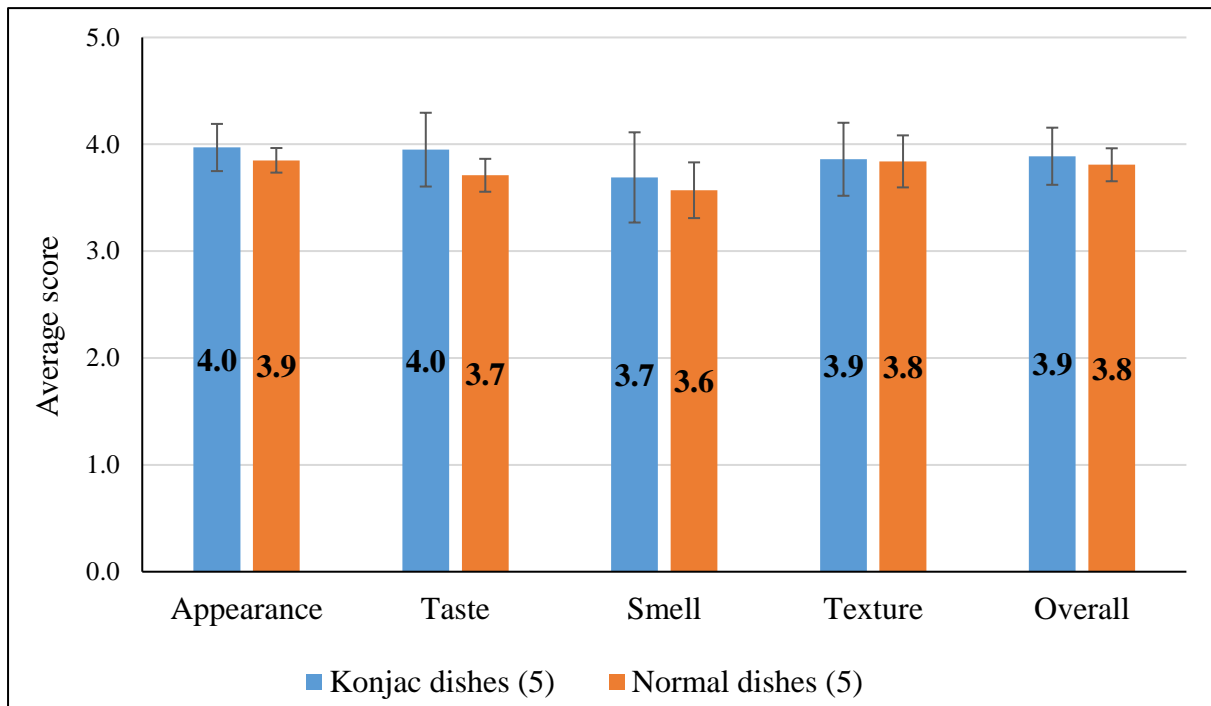


Figure 3: The average score of 20 people on the sensory test of 5 konjac dishes and 5 paired normal dishes

All values are mean  $\pm$  SD. All the data were no significant differences at  $p > 0.05$  by paired Student *t*-test

Figure 3 shows the average score of 20 people on the sensory test of 5 konjac dishes and 5 paired normal dishes. The score of konjac dishes were a little bit higher than normal dishes but no significant difference.

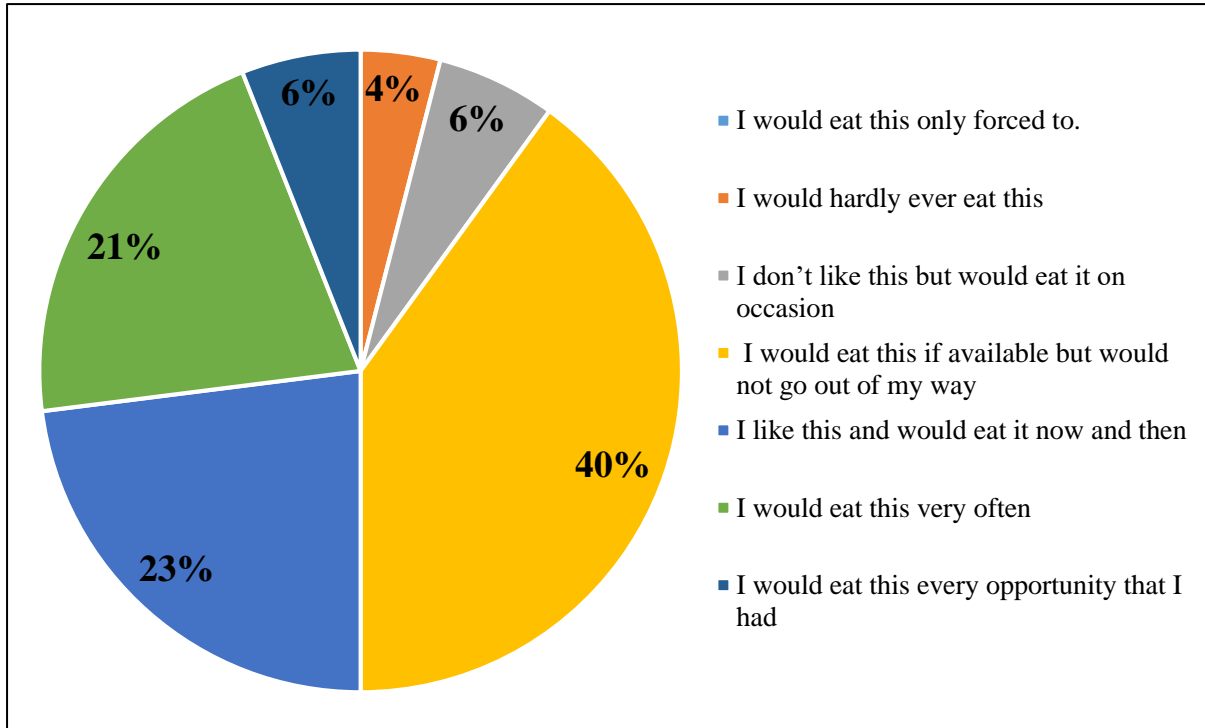


Figure 4: Percent of rating of the food action rating test of konjac dishes

Figure 4 shows the percent of rating of the food action rating test of konjac dishes. 40% of the participants agreed that they would eat this if available but would not go out of their way, 23% said they like this and would eat it now and then, while 21% indicated that they would eat this very often and 6% would eat this every opportunity that they had.

### 3. Mushroom dishes

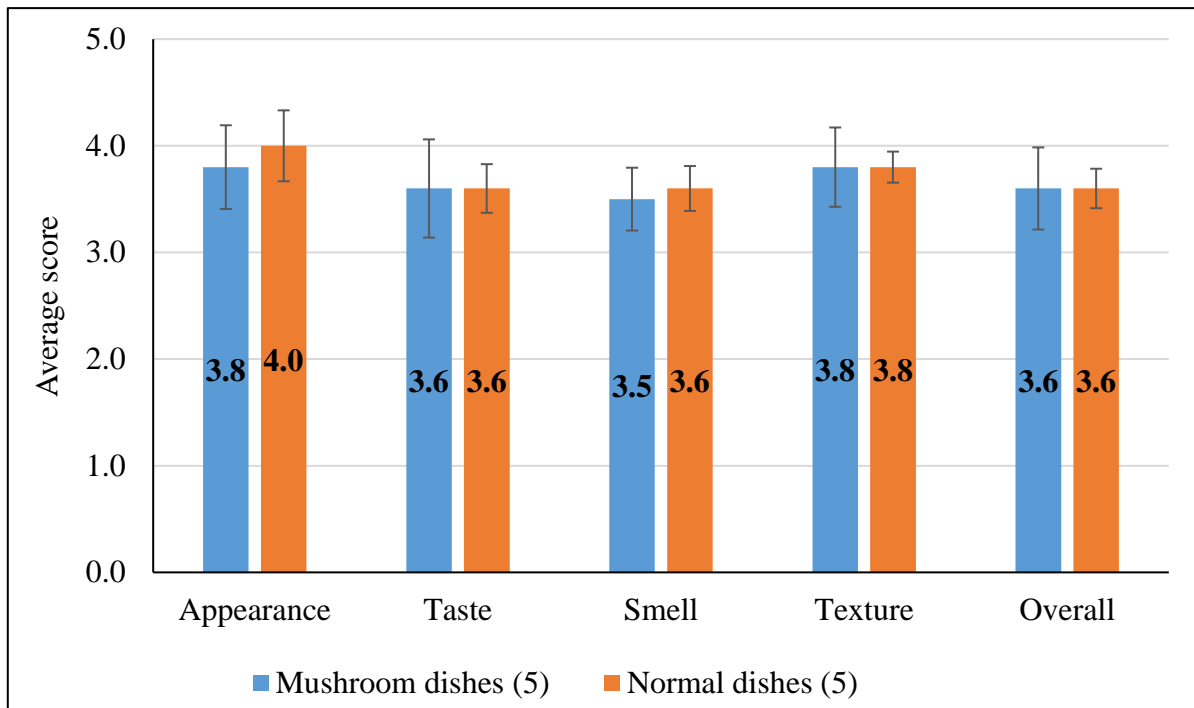


Figure 5: The average score of 20 people on the sensory test of 5 mushroom dishes and 5 paired normal dishes

All values are mean  $\pm$  SD. All the data were no significant differences at  $p > 0.05$  by paired Student *t*-test

Figure 5 shows the average score of 20 people on the sensory test of 5 mushroom dishes and 5 paired normal dishes. Both dishes had the similar score on all the aspects.

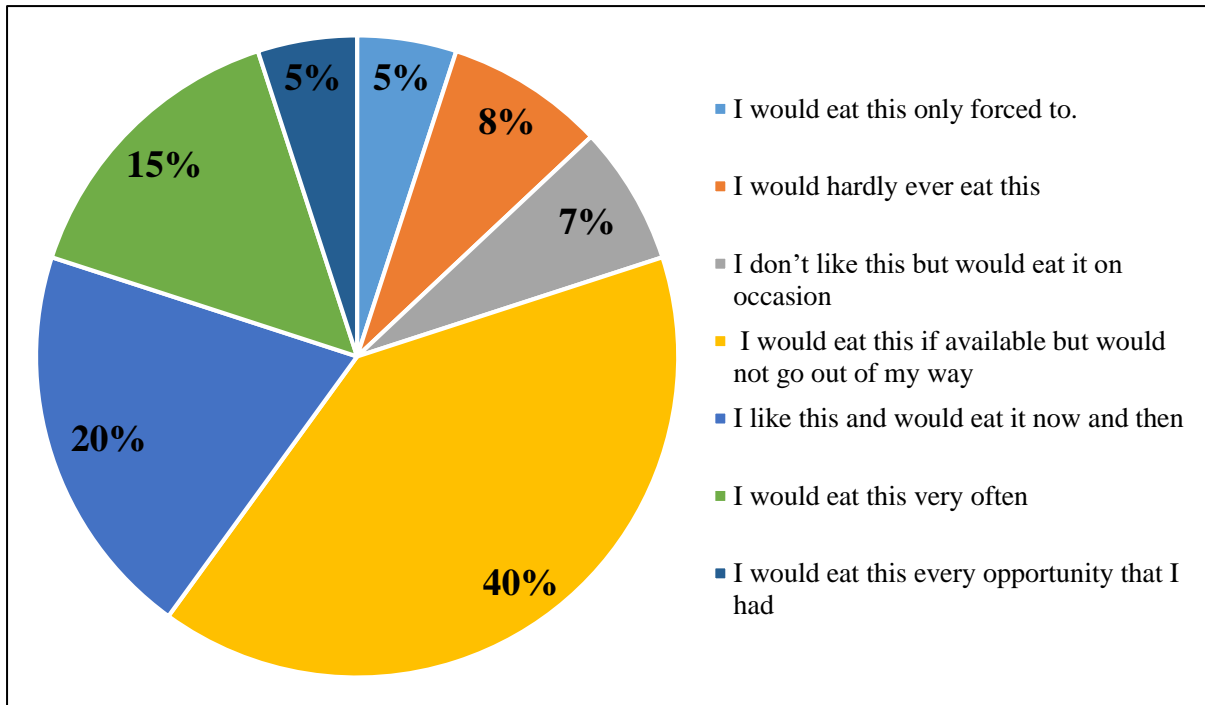


Figure 6: Percent of rating of the food action rating test of mushroom dishes

Figure 6 shows the percent of rating of the food action rating test of mushroom dishes. 40% of the participants agreed that they would eat this if available but would not go out of their way, 20% said they like this and would eat it now and then, while 15% indicated that they would eat this very often and 5% would eat this every opportunity that they had.

#### 4. TSP dishes

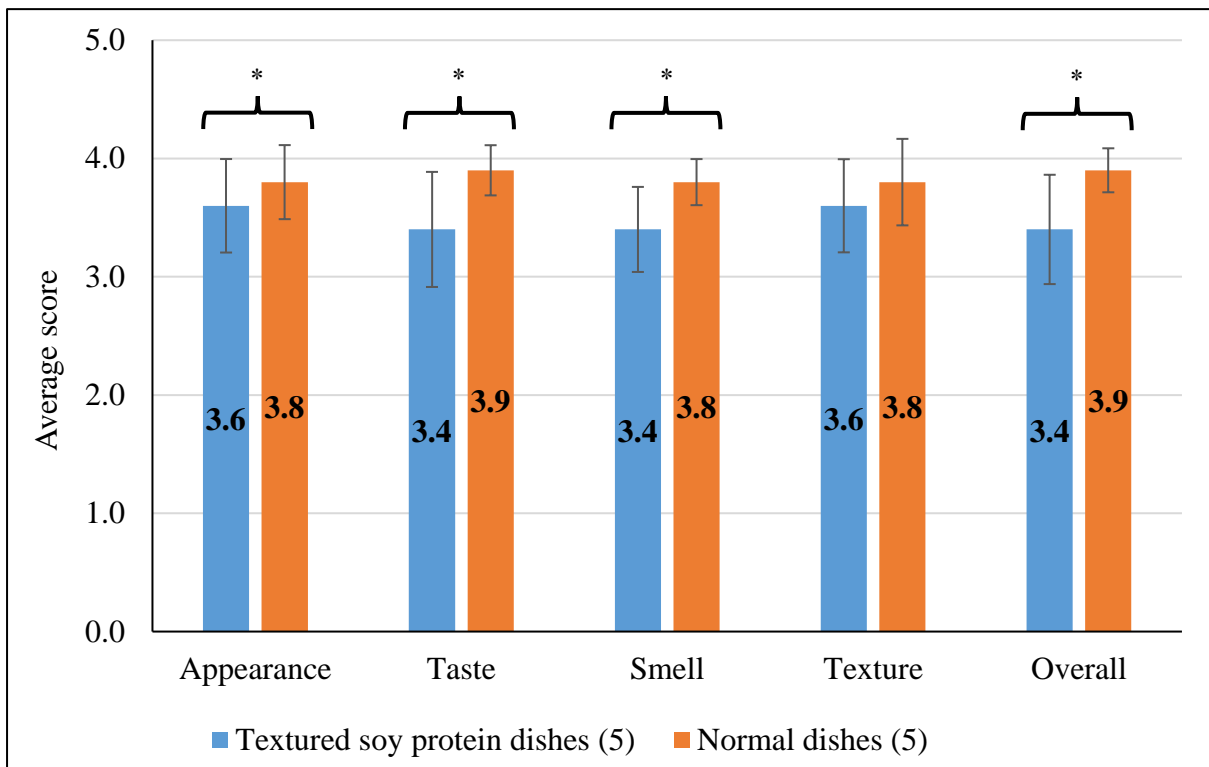


Figure 7: The average score of 20 people on the sensory test of 5 TSP dishes and 5 paired normal dishes

All values are mean  $\pm$  SD.

\*significant differences at  $p < 0.05$  by paired Student *t*-test

Figure 7 shows the average score of 20 people on the sensory test of 5 TSP dishes and 5 paired normal dishes. TSP dishes had lower score on appearance, taste, smell and overall when compare with normal dishes. Both dishes had the similar score on the texture.



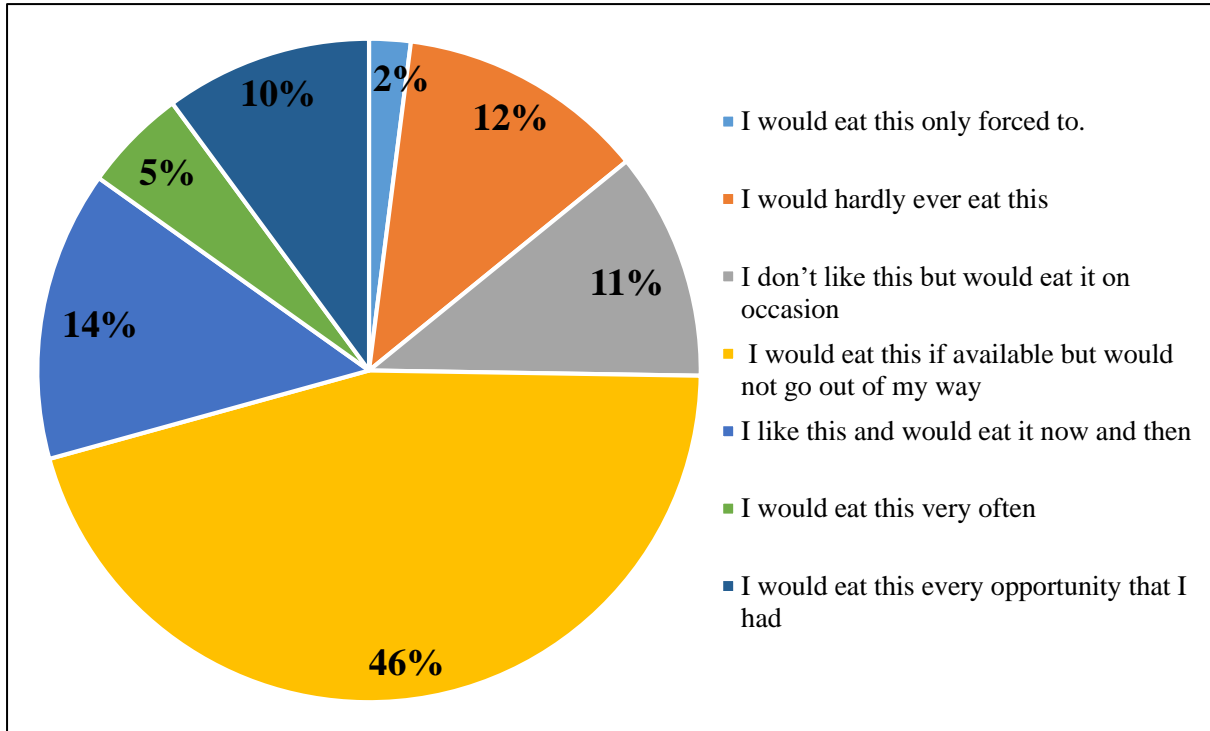


Figure 8: Percent of rating of the food action rating test of TSP dishes

Figure 8 shows the percent of rating of the food action rating test of TSP dishes. 46% of the participants agreed that they would eat this if available but would not go out of their way, 14% said they like this and would eat it now and then, while 5% indicated that they would eat this very often and 10% would eat this every opportunity that they had. However 25% of participants don't like the TSP dishes.

## 5. PGBR dishes

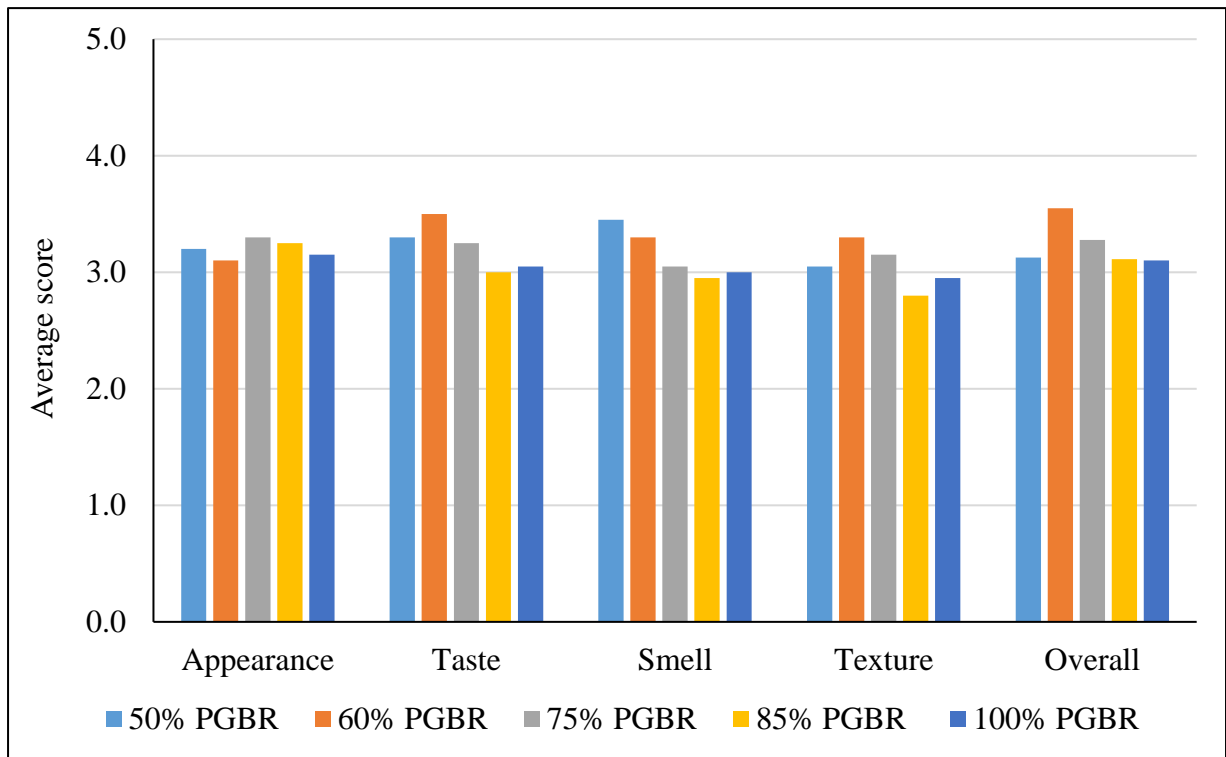


Figure 9: The average score of 20 people on the sensory test of 5 PGBR dishes

Figure 9 shows the average score of 20 people on the sensory test of 5 PGBR dishes. The PGBR dish that had 60%PGBR had highest score on taste, texture and overall. For smell, 50%PGBR dish had highest score. For appearance, 75% PGBR dish had highest score.

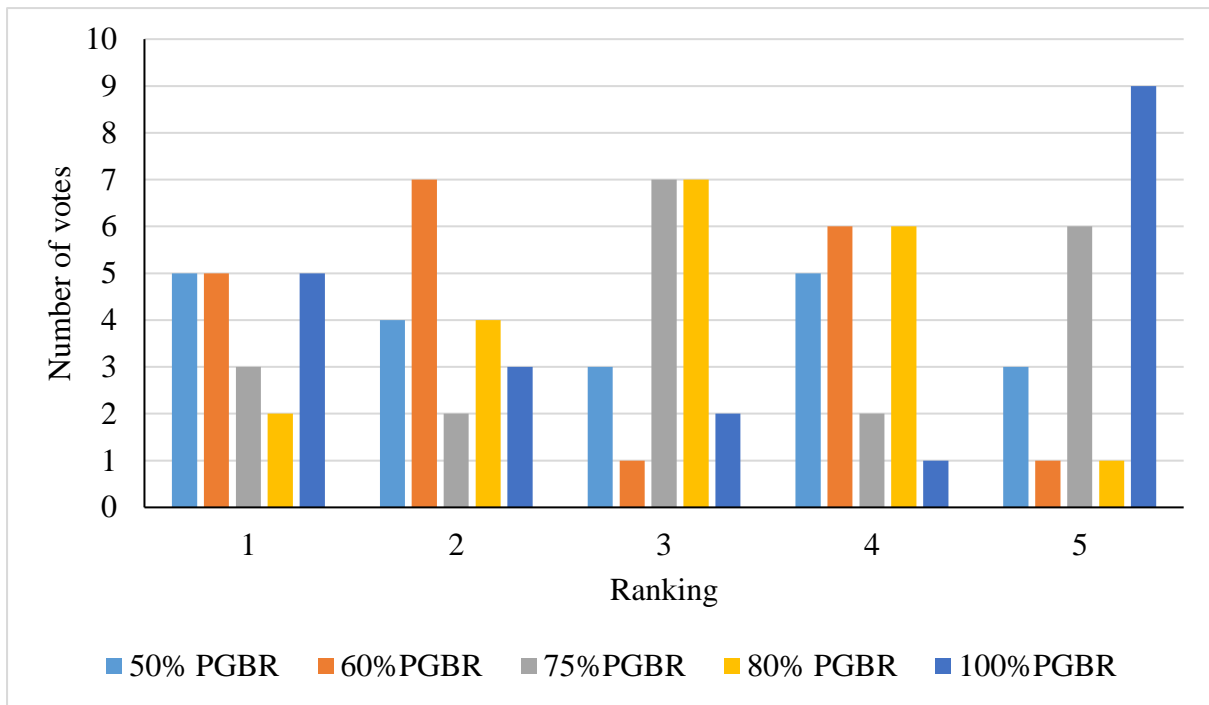


Figure 10. Ranking of PGBR dishes (where 1= most preferred and 5 = least preferred).

Figure 10 shows the ranking of PGBR dishes voted by 20 people. The opinions regarding mixture differed among the participants. 50%PGBR and 60% PGBR mixture got the majority of the votes in “the more preferred part” of the diagram. Others got the majority of votes in “the less preferred part” of the diagram.

## DICUSSION

This study was conducted to evaluate Vietnamese people perception of high-fiber dishes (Konjac, okara, mushrooms, TSP, and PGBR) by Vietnamese people. With the exception of TSP dishes, Vietnamese appeared to accept high-fiber dishes when there was no difference in sensory test scores of high-fiber dishes and normal dishes.

Konjac, okara, mushrooms, TSP and PGBR are available in Vietnam but are rarely used. Japanese use them in their daily meals and combine them with other ingredients to make delicious dishes. This may be the reason why Japanese people don't need to eat too much vegetables, but the fiber consumption is still high. Therefore, we are thinking about using these foods to increase the fiber intake of Vietnamese people. Before that, we need to make sure whether people like it or not. We have learned how to prepare these high-fiber foods in Japan and now we are trying to cook them the Vietnamese way. We tried to cook simple and common dishes so that people can incorporate them into their daily meals. For Konjac, okara, mushrooms and TSP, we made high-fiber dishes and paired normal dishes with the same recipe, the only difference was the high-fiber ingredient. We changed the menu until we felt the new dishes were similar in taste to the regular dishes. In PGBR, we mix PGBR and white rice in different ratios to make it easier to eat while increasing the fiber content of the dish. When choosing the ratio of PGBR, we are guided by the amount of fiber that can be increased per 100 g of rice. With a 50% PGBR mixture, 100 g of rice can contain 1.5 g more fiber. With 60%, 75%, 85% and 100% PGBR mixture, 100 g of rice can contain 1.8 g, 2.25 g, 2.55 g and 3 g more fiber respectively.

The Okara dishes were rated similarly to the normal dishes. Okara smells good, tastes like tofu and is easy to combine with other ingredients without affecting the flavor of the dish. It goes well with pork, egg or cakes. The food effect evaluation test shows that around 80% of respondents would like to eat these dishes.

For Konjac dishes, people also voted it equal with the normal dishes. Konjac has a strong

odour, so we had to boil with salt when cooking to remove it. However, it mixed well with the spices and other ingredients during cooking, so the dish turned out very tasty. Konjac also has a crunchy texture that people really like. In Vietnam, there are 2 types of konjac: 1 in a rectangular block and 1 in the form of noodles (shirataki). The Vietnamese prefer shirataki because it looks like a type of Vietnamese rice noodle (bún) but is crispier.






For the mushroom dishes, all the results of the sensory test were similar to the normal dishes. Compared to other high-fiber ingredients in this study, mushrooms are more familiar to Vietnamese people, so it is easier to find suitable menus, such as stir-fried mushrooms with vegetables and shrimp or tofu stuffed with mushrooms and meat. People are very satisfied with these dishes.

The TSP dishes scored lower than the normal dishes for appearance, taste, smell and overall. TSP smells and tastes strongly of soybeans, even though we used a lot of spice, we can sense it. Also, TSP is quite dry compared to normal meat, so the taste cannot be very good. That could be the reason why people don't like it very much. Even 2% of the participants said that they only eat TSP when they are forced to, which is not the case with other high-fibre dishes. Also, the cooking method we used may not have been the best for TSP. In the future, we need to study more to find out how to make delicious TSP dishes.






For the PGBR dishes, PGBR has a peculiar smell, so the smell of the 50% PGBR mixture was rated the highest. The 60% PGBR mixture had the highest score for flavour, texture, and overall. These 2 mixtures also received the majority of votes in "the more preferred part" question. Others received the majority of votes in "the "less preferred part" of the chart. It will take some time for the Vietnamese to familiarise themselves with PGBR.

After this study, I modified the recipe a little according to the comments of the participants and published a cookbook. In this cookbook, konjac dishes, okara dishes, mushroom dishes, common high-fiber vegetables dishes and PGBR dishes were included. With the exception of the PGBR dishes, 1 serving of each dish contained at least 3.0 g of fiber.






### Konjac dishes (shirataki)

Stewed vegetables with shirataki and chicken	Stir-fried shirataki with cabbage, carrot and beef	Mixed stir-fried shirataki	Shirataki salad	Shirataki soup
				






### Okara dishes

Okara meat-molded eggs	Okara meatballs	Okara fried-cake	Okara, pork wrapped in betel leaves	Okara meatballs with sweet and sour sauce
				

### Mushroom dishes

Mixed soup	Stir-fried mushrooms with bok choy and shrimp	Tofu stuffed with mushrooms and meat	Mushroom molded eggs	Mushroom salad
				

### Common high-fiber vegetables dishes

Boiled vegetable	Stir-fried bamboo shoots with beef and betel leaves	Fried spring rolls	Bean rib soup	Mix stir-fried
				

## **CONCLUSION**

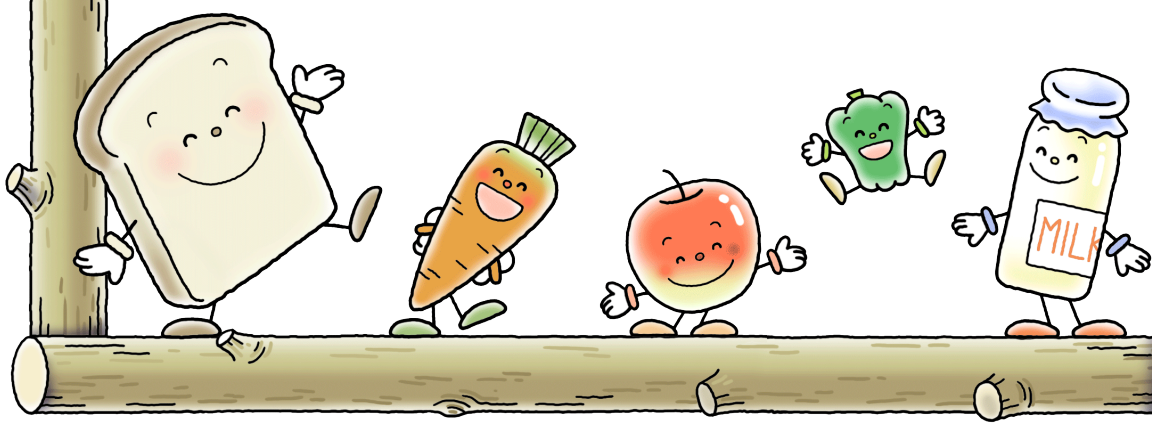
This study indicates that okara, konjac, mushroom and PGBR can be integrated into Vietnamese dishes and increase the fiber intake of the Vietnamese. In addition, suitable preparation methods for TSP need to be found to make them tastier and easier to eat.

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**STUDY 3: COMPARISON  
OF NUTRIENT INTAKE IN  
VIETNAMESE CHILDREN  
AS CALCULATED BY  
THREE DIFFERENT  
FOOD COMPOSITION  
TABLES**



## INTRODUCTION

Food composition tables (FCTs) are an essential resource for nutrition research, public health policy, and clinical practice. FCTs are used to estimate nutrient intakes in dietary surveys, assess dietary adequacy, and develop evidence-based recommendations for healthy diets. They are also used to examine the relationship between diet and health outcomes, such as chronic diseases. Many countries have a national or regional FCT, but on the other hand there are still many developing and some developed countries without such tables. These countries rely on data from other sources such as the United States Department of Agriculture or FCTs from neighboring countries. The Vietnamese FCT was published based on domestic research and analysis and with reference to a number of international ingredient databases (1). The Vietnamese FCT was first published in 1972 and has been revised three times. The latest version as of 2023 was published in 2017. However, there is very little updated data, and the reference documents are very old such as Southeast Asia FCT 1972 – Food composition for international use, and ASEAN FCT 2000. “Inadequate food composition data and their use may then lead to erroneous research results, wrong policy decisions (particularly in nutrition, agriculture and health), misleading food labels, false health claims and inadequate food choices” (2).

FCTs vary from country to country due to technical differences such as food descriptions, nutrient definitions, and analytical methods. A comparable FCT is critical for accurate international comparison of energy and nutrient intakes. Unfortunately, when comparing dietary data across countries, the importance of FCTs is often overlooked and people focus solely on survey methods, which can lead to various errors. For instance, in the previous study, we found that 10-year-old Vietnamese children consumed significantly less dietary fiber compared with Japanese children (about 4 g and 12 g, respectively) without considering the comparability of FCTs. However, when examining the FCTs, we found that the fiber content of the same food was very different in the two countries. For example, the Vietnamese FCT

specifies 0.2 g of fiber in 100 g of bread, whereas the Japanese FCT specifies 2.7 g. This discrepancy highlights the lack of comparability in fiber intake of children in these two countries.

Japan and Thailand are the Asian countries that generate and disseminate their own food composition tables. It is possible that the foods in Vietnam, Japan, and Thailand are quite similar. Therefore, this study was conducted to calculate the nutrient intake of Vietnamese children using different food composition tables from Vietnam, Japan, and Thailand and to clarify the influence of these differences on the calculated nutrient intake.

A. Vietnamese FCT 2017				Thành phần chính - Proximate composition							
TT	Mã số/ Code	Tên và mô tả thực phẩm Food name and description		Thái độ	Năng lượng	Nước	Protein	Chất béo	Carbohydrate	Chất xơ	Tro tổng
		Tiếng Việt	English								
12	01012	Bánh mì	Bread, French style	0	250	37.2	7.9	0.8	52.8	0.2	1.3

B. Japanese FCT 2020		可食部 100g 当たり													
食品番号	食品名	% 廃棄率	エネルギー		水分	たんぱく質 アミノ酸組成による たんぱく質	脂質				コレステロール	利用可能炭水化物	糖類*	食物繊維総量	糖アルコール
			kJ	kcal			脂肪酸の トリアシルグリセロール当量	飽和脂肪酸	n-3系 多価不飽和脂肪酸	n-6系 多価不飽和脂肪酸					
			g	g	g	g	g	g	g	g	mg	g	g	g	g
01026	角形食パン 食パン	0	1050	248	39.2	7.4	3.7	1.50	0.05	0.77	0	44.2	5.3	4.2	0
01031	フランスパン	0	1231	289	30.0	8.6	(1.1)	(0.29)	(0.03)	(0.60)	(0)	58.2	1.8	2.7	-

Photo 1: Fiber content of bread in A. Vietnamese FCT 2017 and B. Japanese FCT 2020

## METHODS

*Dietary survey:* Using dietary survey of Vietnamese children aged 10 years old from study 1

### *Food composition tables*

The Vietnamese Food Composition Table 2017 (1), Japanese Food Composition Table 2020 (3), and Thai Food Composition Table 2015 (4) were used to calculate energy, protein, lipid, carbohydrate and fiber intake.

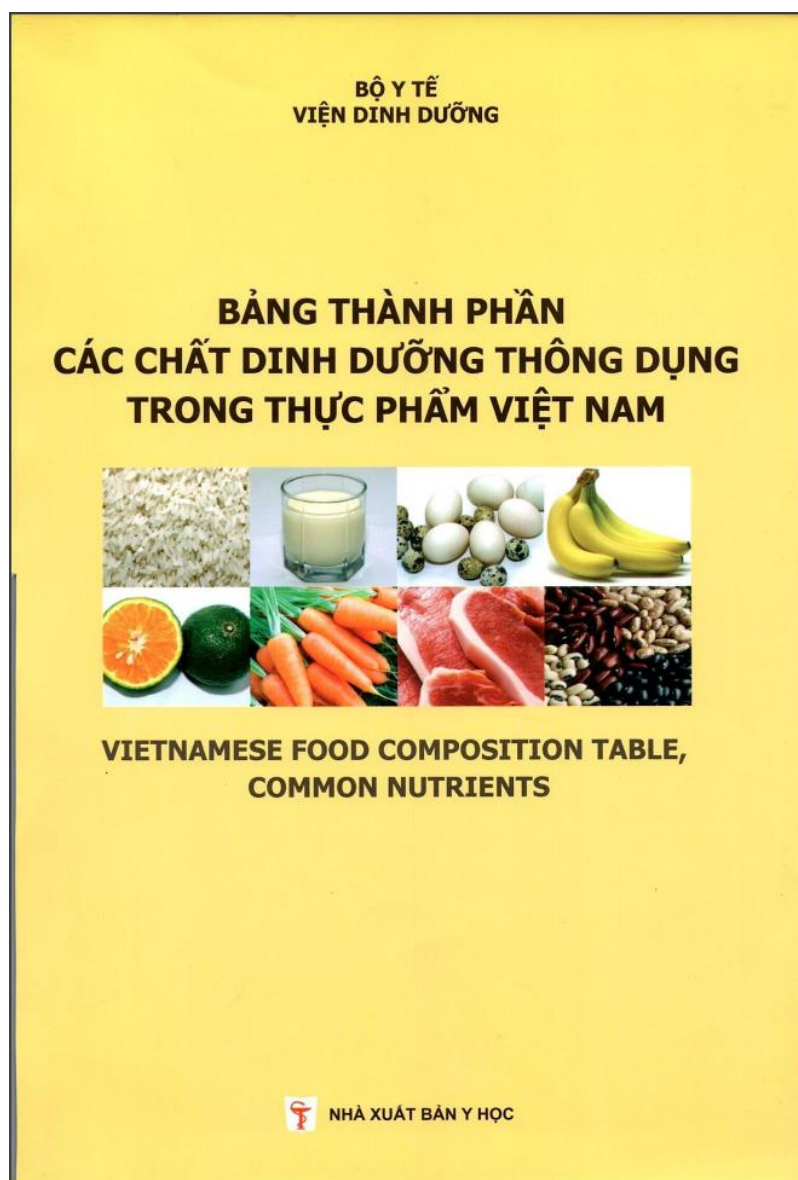
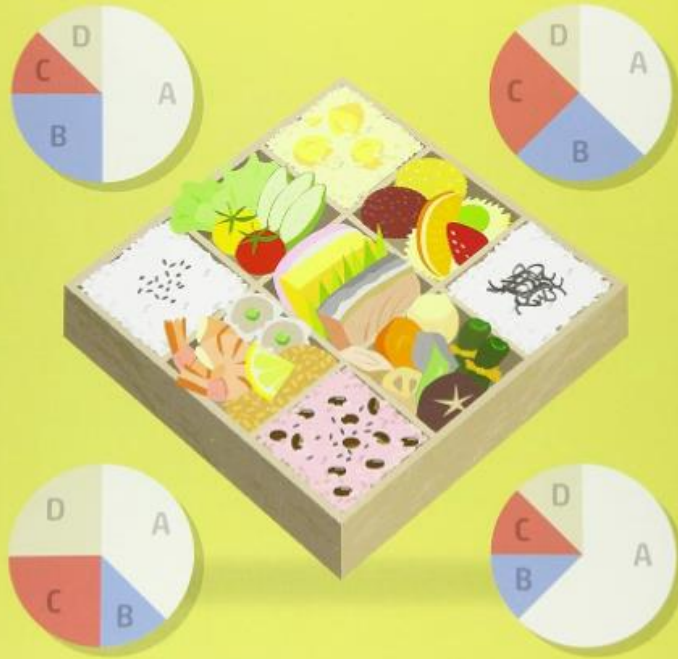


Photo 2: Vietnamese Food Composition Table 2017

# 日本食品標準成分表 2020年版(八訂)



文部科学省 科学技術・学術審議会  
資源調査分科会 報告

Photo 3: Japanese Food Composition Table 2020

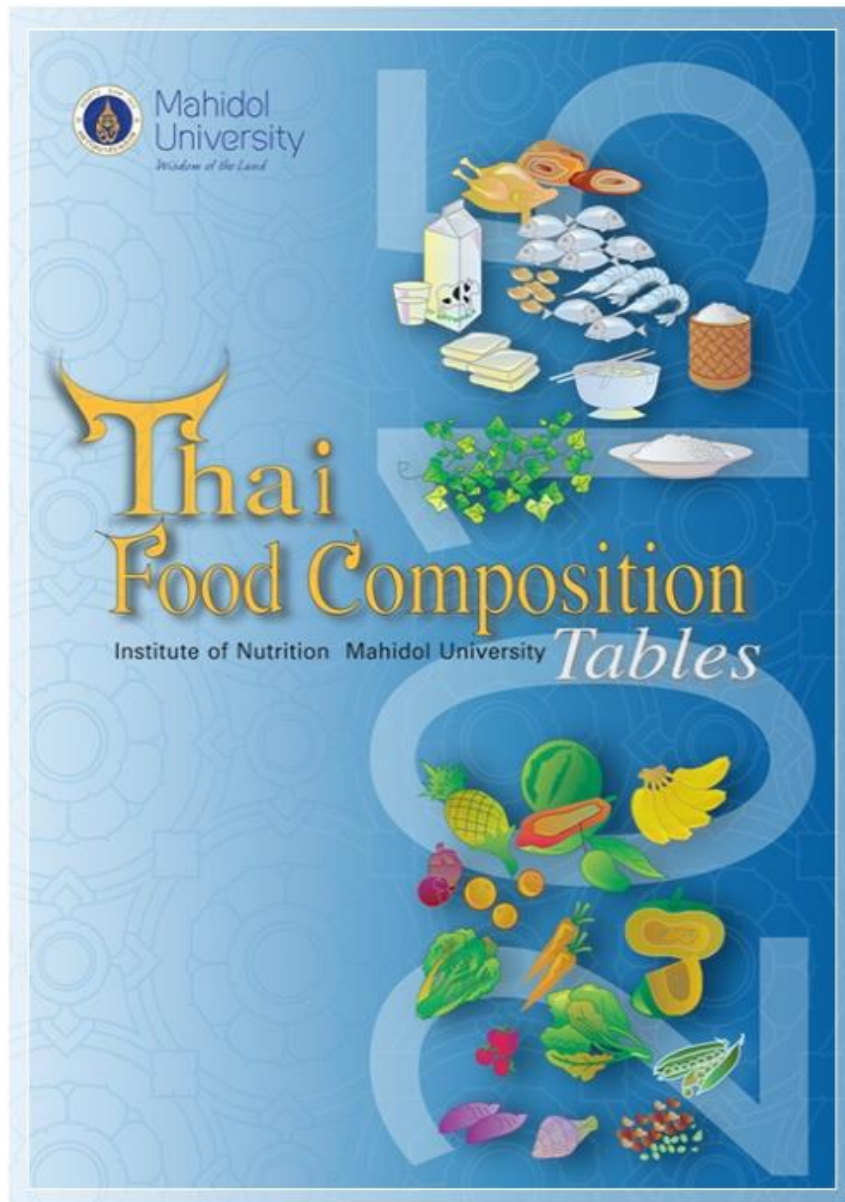


Photo 4: Thai Food Composition Table 2015

### *Statistical analysis*

Mean and standard deviation were calculated and the differences of means were tested by ANOVA and Tukey-Kramer post-hoc. The Spearman correlation analyses were performed to estimate the association between the FCTs. p-value smaller than 0.05 was considered to be statistically significant. Statistical analyses were performed using IBM SPSS statistics 26.

## RESULTS

Table 1 shows the comparison of energy and nutrient intakes of Vietnamese children calculated by 3 different FCTs. Energy, protein, lipid and carbohydrate intakes have no significant difference. Fiber intakes was significantly lower when calculated using Vietnamese FCT. Moreover, all nutrients were significantly correlated between each FCT.

Table 1: Comparison of energy and nutrient intake of Vietnamese children (n=36) calculated by Vietnamese FCT, Japanese FCT and Thai FCT

	Vietnamese FCT		Japanese FCT		Thai FCT		p value <sup>1</sup>	p value <sup>2</sup>	Spearman's correlation coefficient <sup>3</sup>		
	Mean	SD	Mean	SD	Mean	SD			V-J	V-T	J-T
Energy (kcal)	1851	400	1838	399	1918	424	>0.05		0.97	0.96	0.98
Protein (g)	76.9	18.8	72.7	20.0	71.1	19.9	>0.05		0.90	0.92	0.98
Lipid (g)	58.6	22.7	53.4	19.0	58.1	22.6	>0.05		0.78	0.71	0.92
Carbohydrate (g)	260.1	52.6	274.3	54.6	272.6	58.3	>0.05		0.98	0.96	0.98
Fiber (g)	4.1	1.8	7.9	4.3	9.6	4.1	<0.0001	<0.0001 <sup>VJ,VT,JT</sup>	0.72	0.73	0.82

<sup>1</sup>ANOVA; <sup>2</sup>Tukey-Kramer;

V: Vietnamese food composition table, J: Japanese food composition table, T: Thai food composition table ;

<sup>3</sup>all p values of correlation coefficients are <0.001

**Table 2: Example of fiber intake in the day of a child**

<b>Food</b>	<b>Amount (g)</b>	<b>Vietnam FCT</b>	<b>Japan FCT</b>	<b>Thai FCT</b>
<b>Rice</b>	152	0.7	0.8	1.1
<b>French bread</b>	<b>54</b>	<b>0.1</b>	<b>1.5</b>	<b>2.2</b>
<b>Potato chip</b>	<b>40</b>	<b>0.0</b>	<b>1.7</b>	<b>1.7</b>
<b>Rice cake</b>	12	0.1	0.1	0.4
<b>Pears</b>	<b>105</b>	<b>0.6</b>	<b>1.5</b>	<b>1.9</b>
<b>Watermelon</b>	57	0.1	0.2	0.2
<b>Papaya</b>	64	0.3	1.4	1.2
<b>Spinach</b>	65	0.9	1.2	1.6
<b>Sausage</b>	50	0.0	0.0	0.5

Table 2 shows an example of fiber intake in the day of a child. A big difference between FCTs in fiber can be seen for French bread, potato chips, and pears. 54g of French bread has 0.1g of dietary fiber in the Vietnam FCT, 1.5g in the Japan FCT, and 2.2g in the Thailand FCT. 40g of potato chips has 0 dietary fiber in the Vietnam FCT and 1.7g in the Japan FCT and the Thailand FCT. 105g of pears has 0.6g of dietary fiber in the Vietnam FCT, 1.5 in the Japan FCT, and 1.9g in the Thailand FCT.



## DISCUSSION

In this study, we used the food composition tables from Vietnam, Thailand, and Japan to analyze the dietary intake of Vietnamese children. We found that, when calculated by the Vietnamese FCT, the fiber intake of children is lower than when calculated by other FCTs, suggests that the low fiber intake of Vietnamese children may be caused by problem with the Vietnamese FCT. Moreover, energy and nutrient intake correlated strongly across all FCTs.

Fiber intake calculate by the 3 FCTs was very different. Several factors may contribute to this difference.

First, the reason for this could be the disparities in measurement methods and the inclusion of specific fiber types. Fiber is commonly classified as soluble or insoluble. The fiber content listed in the Vietnamese FCT is actually crude fiber – insoluble fiber. Initially, fiber was considered an indigestible component and referred to as "crude fiber." This was determined by measuring the residues in plant foods that remained after extraction with a solvent, dilute acid, and dilute alkali (5). However, this method of measuring crude fiber content has been found to grossly underestimate the actual fiber content of human foods (6). The error in the crude fiber method arises from the sequential extraction process, which dissolves 50 to 90% of the lignin, 85% of the hemicellulose, and 0 to 50% of the cellulose. This error through loss can be as high as 700%, depending on the proportions of lignin, cellulose, and hemicellulose in the fiber (7). On the other hand, fiber in Thailand and Japanese FCT includes both soluble and insoluble fiber and follows the Association of Official Analytical Chemists (AOAC) Official Method of analysis. Thailand used enzymatic-gravimetric method to analyze fiber composition. This method provides a measure of total dietary fiber (insoluble dietary fiber; high molecular weight soluble dietary fiber) by enzymatic removal of available starch and solubilization and extraction of a portion of the protein; the remaining residue is dried, weighed, and corrected for crude protein and ash contents (8). In Japan, in addition to the enzymatic-gravimetric method, analysts also use the Liquid Chromatography method to determine low molecular

weight soluble dietary fiber (9). Due to significant variations in analytical methods and type of fiber, comparison of fiber consumption results among the three countries may not be possible. Further research is needed to establish harmonized definitions and measurement methods for dietary fiber to ensure accurate assessment and comparison of fiber intake across countries.

Second, environmental, genetic, and processing differences such as feed, soil, climate, genetic resources, storage conditions, processing, and fortification could be a factor. However protein, lipid and carbohydrate intake had no significant differences between countries and were analyzed by the same method, suggesting that the food sources are relatively similar. Minatsu Kobayashi et al. also found that protein and carbohydrate intakes were similar and fiber intake was different when calculated by the Thailand and Japanese FCTs. Nevertheless, the reason for difference in fiber was not pointed out (10).

When using the Vietnamese FCT, the amount of fiber intake was underestimated. This may lead to inaccuracies in providing dietary guidelines and nutrition interventions. Although children's fiber intake was higher when calculated using the Japanese and Thai FCTs, it was still below the Vietnamese recommended intake of 20-22g (11) and compared with Japanese children's intakes of 11.9 in boys and 12.6 in girls (12). This highlights the need for additional strategies to increase fiber intake in children. One viable method is to intervene in school meals. To give an idea, Diep et al. were able to increase the fiber intake of 10-year-old children from school lunch from 1.1g to 1.9g (calculated by Vietnamese FCT) by increasing the number of materials and changing the cooking method without increasing the cost (13).

The Vietnamese FCT still lacks information, and the data are not up-to-date. When comparing nutrient intakes between countries, it is better to use the better value of another country if the FCT completion rate of one country is low. In this study, intake levels of energy and all nutrients were highly correlated between different FCTs suggesting that the Thailand FCT or Japanese FCT can be used to calculate nutrient intakes of Vietnamese. However, the Vietnamese FCT should be improved. It should be generated according to international

guidelines so that it is comparable and reliable.

The limitation of the study was that we did not compare the vitamin and mineral contents of the different food composition tables, which may differ significantly.

## **CONCLUSION**

This study suggests that the low fiber intake of Vietnamese children may be caused by problems with the Vietnamese FCT. It is necessary to revise the measurement method for dietary fiber in the Vietnamese FCT.

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Finally, I would like to give many thanks to my family and my friends, for greatly encouraging me in the progress of my studies and for supporting me in overcoming many obstacles in life.

## APPENDIX

### Record of Publications

**Book: The Fiber Rich Cookbook - Medical Publishing House – 2020**





TRUNG TÂM NGHIÊN CỨU  
DINH DƯỠNG VÀ  
VĂN HÓA THỰC PHẨM  
CHÂU Á



十文字学園女子大学  
JUMONJI UNIVERSITY



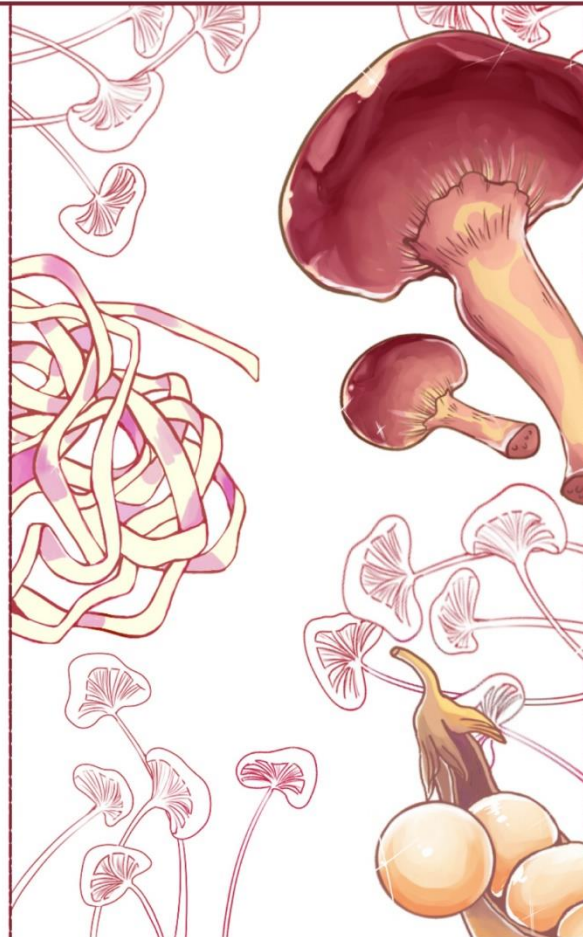
VIỆN ĐÀO TẠO  
Y HỌC DỰ PHÒNG  
VÀ Y TẾ CÔNG CỘNG

# SỔ TAY CÁC MÓN ĂN

THE FIBER RICH COOKBOOK

## GIÀU CHẤT XƠ

GS.TS. Lê Thị Hương CNDD. Nguyễn Hương Giang





# はじめに

食べることは、すべての人の日常生活に不可欠。適切でバランスの取れた栄養素を含む食事は、心身の健康に必須です。十分な栄養を提供するために、4つの主要な食事群からさまざまな食品の組み合わせを準備する必要があります。すなわち炭水化物群、タンパク質群、脂肪群および野菜群。すなわち、米、トウモロコシ、ジャガイモ、麺などの炭水化物の多い群；肉、魚、卵、牛乳、豆腐、豆などたん白質の多い群；動物性脂肪、植物油など脂質の多い群；そして食物繊維、ビタミン、ミネラルの多い野菜群である。

しかし、現在のベトナムの人々は炭水化物群、タンパク質、脂肪群には注意していますが野菜群にはあまり注意を払いません。いくつかの調査では、ベトナム人の繊維摂取量は非常に少なく、約6~7g/日であり、ベトナム国立栄養研究所の推奨摂取量(20-22g/日)の約1/3であることが報告されています。繊維は役に立たないように見えますが、血中コレステロール、血糖値、体重、癌、排便などを調節し人間の健康に重要な意味を持ちます。

それでは、どうすればベトナム人の繊維摂取を改善できるでしょうか？日本は、世界でももっとも長寿国として知られています。平均繊維消費量も約15~16g/日で、ベトナム人の消費量の約2倍あります。日本の食事には、ベトナム人が食物繊維を増やす方法として参考にできることが沢山あります。例えば日本人は、おから、こんにやく、きのこ、発芽玄米などの食物繊維が豊富な食品を多く使用しています。これらの食品はすべてベトナムで生産できますが、あまり利用されていません。

私たちは、ベトナムでも食物繊維の豊富な食材を、私たちの食文化に合わせて美味しく食べる方法を検討してきました。この本は、そのような料理の作り方をわかりやすく説明したものです。

皆様が、この本を使用することにより、健康により栄養価の高い料理を楽しめることを願っています。

最後に、この研究、出版に、ご指導・ご協力いただきました十文字学園大学の志村二三夫学長はじめとする皆様に対して厚くお礼申し上げます。

編集者

5

## CHẢ LÁ LỐT OKARA

### NGUYÊN LIỆU

25g bã đậu  
75g thịt lợn xay  
5g hành lá  
5g hành khô  
3g tỏi  
0.7g muối  
0.3g tiêu  
Lá lốt, dầu ăn.

### CÁCH LÀM

- Hành khô, tỏi bóc vỏ, đập dập rồi băm nhỏ. Hành lá cắt nhỏ.
- Cho thịt và bã đậu vào âu lớn, trộn đều với hành, tỏi, 1 ít lá lốt thái sợi và muối, tiêu.

(Khẩu phần 1 người)

(Năng lượng: 321 Kcal, chất bột đường: 5.0g, chất đạm: 14.5g, chất béo: 27.1g, chất xơ: 3.2g)



# RAU CỦ HẦM

## NGUYÊN LIỆU

40g bún nửa  
20g ngó sen  
20g cà rốt  
20g măng  
15g nấm hương tươi  
5g đậu cove  
50g đùi gà bỏ xương  
2g muối  
200ml nước

## CÁCH LÀM

(Khẩu phần 1 người)  
(Năng lượng: 140 Kcal, chất bột đường: 7.2g,  
chất đạm: 12.4g, chất béo: 6.7g,  
**chất xơ: 3.2g**)



# CẢI CHÍP XÀO NẤM

## NGUYÊN LIỆU

50g cải chip  
25g nấm hương tươi  
25g nấm ngọc châm/ nấm hải sản  
30g cà rốt  
30g tôm sú  
10g mayonnaise  
5g tỏi  
10g dầu hào  
Tiêu, rau mùi, dầu ăn.

## CÁCH LÀM

1. Cải chip cắt gốc, rửa sạch;  
cà rốt rửa sạch, bỏ vỏ,  
tỉa hoa rồi cắt lát 1cm.  
Luộc cải, cà rốt với nước có pha ít muối.

2. Nấm hương rửa sạch,  
cắt xéo chữ thập lên mặt nấm.

(Khẩu phần 1 người)  
(Năng lượng: 184 Kcal, chất bột đường: 6.3g,  
chất đạm: 9.3g, chất béo: 13.6g,  
**chất xơ: 3.0g**)



## Article

1. **Nguyen Huong Giang**, Nguyen Mai Phuong, Nguyen Van Diep, Yamamoto Shigeru.

*Comparison of Nutrient Intake in Vietnamese Children Calculated by Three Different Food Composition Tables. Asian Journal of Dietetics 5(2-3), 63-66, 2023*

Asian Journal of Dietetics 2023

### **Original**

#### **Comparison of Nutrient Intake in Vietnamese Children Calculated by Three Different Food Composition Tables**

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**ABSTRACT** *Background and purpose.* Food Composition table is an indispensable tool in dietary study. Vietnamese food composition table is published based on domestic researches and foreign references. However, data are not up to date, which could lead to inaccurate nutrient intake estimates and are not comparable with data from other countries. Therefore, this study was conducted to calculate the nutrient intakes of Vietnamese children using different food composition tables from Vietnam, Japan and Thailand and to clarify the influence of these differences on calculated nutrient intakes. *Methods.* Dietary survey was conducted by 24-hour recall method, at a primary school in suburban of Hanoi city, Vietnam on 3 non-consecutive days (2 school days and 1 weekend day). The subjects were 10 year old children, 21 boys, and 15 girls. Energy and nutrient intakes was calculated using Vietnamese food composition table (FCT), Japanese FCT and Thai FCT. *Results.* Dietary fiber intake was significantly lower when Vietnamese FCT was used for calculation than Japanese and Thai FCT. The difference could be due to the different analysis of dietary fiber in each country. There were no significant differences between FCTs in energy, protein, fat, and carbohydrate intake. *Conclusion.* This study suggests that the low dietary fiber intake of Vietnamese children may be due to the problem of Vietnamese FCT. Further research is needed to develop internationally comparable national FCT.

**Keywords:** Food composition table, Vietnamese children, nutrient intake, low fiber intake

#### **INTRODUCTION**

Food composition tables (FCTs) are an essential resource for nutrition research, public health policy, and clinical practice. FCTs are used to estimate nutrient intakes in dietary surveys, assess dietary adequacy, and develop evidence-based recommendations for healthy diets. They are also used to examine the relationship between diet and health outcomes, such as chronic diseases. Many countries have a national or regional FCT, but on the other hand, there are still many developing and some developed countries without such tables. These countries rely on data from other sources such as the United States Department of Agriculture or FCTs from neighboring countries. The Vietnamese FCT was published based on domestic research and analysis and with reference to a number of international ingredient databases (1). The Vietnamese FCT was first published in 1972 and has been revised three times. The latest version as of 2023 was published in 2017. However, there is very little updated data, and the reference documents are very old such as Southeast Asia FCT 1972 – Food composition for international use, ASEAN FCT 2000. “Inadequate food composition data and their use may then lead to erroneous research results, wrong policy decisions (particularly in nutrition, agriculture and

health), misleading food labels, false health claims and inadequate food choices” (2).

FCTs vary from country to country due to technical differences such as food descriptions, nutrient definitions, and analytical methods. A comparable FCT is critical for accurate international comparison of energy and nutrient intakes. Unfortunately, when comparing dietary data across countries, the importance of FCTs is often overlooked and people focus solely on survey methods, which can lead to various errors. For instance, we found that 10-year-old Vietnamese children consumed significantly less dietary fiber compared with Japanese children (about 4 g and 12 g, respectively) without considering the comparability of FCTs (3,4). However, when examining the FCTs, we found that the fiber content of the same food was very different in the two countries. For example, the Vietnamese FCT specifies 0.3 g of dietary fiber in 100 g of flour, whereas the Japanese FCT specifies 2.7 g. This discrepancy highlights the lack of comparability in fiber intake of children in these two countries.

Japan and Thailand are the Asian countries that generate and disseminate their own food composition tables. It is possible that the foods in Vietnam, Japan, and Thailand are quite similar. Therefore, this study was conducted to calculate the nutrient intake of Vietnamese children using different food composition tables from Vietnam, Japan, and Thailand and to

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2. **Nguyen Huong Giang**, Nguyen Mai Phuong, Nguyen Van Diep, Nobuko Sarukura, Hitomi Takeichi, Ayami Sano, Sumiko Kamoshita, Yoko Ozaki, Saori Okushima, Hitoshi Iizuka, Masayo Kaneda, Shigeru Yamamoto. *Energy and Nutrient Intakes and Recommendations from a Survey of Children in a Coastal City in Central Japan*. Asian Journal of Dietetics 3(3), 98-103, 2021.

**Original**

**Energy and Nutrient Intakes and Recommendations from a Survey of Children  
in a Coastal City in Central Japan**

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Hitomi Takeichi<sup>2</sup>, Ayami Sano<sup>2</sup>, Sumiko Kamoshita<sup>2</sup>, Yoko Ozaki<sup>3</sup>, Saori Okushima<sup>3</sup>,  
Hitoshi Iizuka<sup>3</sup>, Masayo Kaneda<sup>5</sup>, Shigeru Yamamoto<sup>1,2\*</sup>

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**ABSTRACT:** *Background:* Childhood obesity is a world-wide problem but Japan is an exception. We tried to find the dietary factors for this through a nutrition survey in Japan. *Methods:* A cross-sectional dietary survey was conducted in Okazaki City, a mid-size city, in the central part of Japan and facing the Pacific Ocean. The subjects were 10 year old children (35 boys, 30 girls) and 13 year old children (39 boys, 33 girls). Height and weight were measured. Energy and nutrient intakes were measured by the photograph method using Calorie Smile software on 2 non-consecutive days including 1 school day and 1 weekend day. *Results:* Weight for height was mostly within the normal range (within 0.8-1.2 mean). However, the average energy intake was lower than the recommended level, especially for the older children. Protein intake was adequate if compared with the recommendation in grams but was deficient when compared with the recommended value as percentage of energy (13-20%). Average lipid intake was close to the upper limit of lipid recommendation (30% of energy), indicating that about half of the students took more than the upper limit. Dietary fiber intake did not reach the recommended values. Ca intake was close to the recommended amount on the school day, but significantly lower on the weekend day. Energy and nutrient intakes were lower on the weekend day than on the weekday. *Conclusion:* Despite the lower energy intake than recommendation, the weight for height of the children were mostly in the normal range, suggesting the energy requirements was too high. If the protein requirement is defined as 13-20% of energy recommendation, about 30% of children took lower than the minimum level, suggesting this method is improper. Results of energy and nutrients intakes and the recommendations were inconsistent and further studies are necessary to find the proper direction of child nutrition.

Key words: school children, energy, nutrients, intake, recommendation

**INTRODUCTION**


Childhood obesity is a world-wide problem but Japan is an exception. Among the 38 OECD member countries in 2018, the obesity rate of Japanese children was 17.5%, which was the second lowest (median 31.4%) (1). Obese children are at greater risk of developing hypertension and metabolic disorders. Psychologically, obesity can lead to poor self-esteem, eating disorders and depression. Childhood obesity is particularly concerning as it is a strong predictor of obesity in adulthood, which is linked to diabetes, heart disease and certain types of cancer (2). It is worth considering the factors in the low prevalence of obesity in Japanese children. From our previous study of 7-, 10-, and 13-year-old children in an area of western Japan, energy intake was lower than the recommendation, especially in older children (3). It is necessary to confirm these results in other parts of Japan and we conducted this study in a central part of Japan. We tried to evaluate the new method for DRI of protein in Japan. It is expressed as 13-20% of

protein is difficult to understand because among the various nutrients, the protein requirement has been most thoroughly studied mainly by nitrogen balance. This was never expressed as a percentage of energy. We should consider the fact that the protein requirement does not change in proportion to energy intake. According to the US/Canadian Dietary Reference Intakes, the recommendation for protein of 0.8 g protein/kg/d is "the average daily intake level that is sufficient to meet the nutrient requirement of nearly all (98%) healthy individuals (5). The panel also states that "no additional dietary protein is suggested for healthy adults undertaking resistance or endurance exercise. According to the national nutrition survey in Japan, average protein intake of Japanese is about 1.2g/kg body weight, about 50% higher than the recommendation (6). In this study we tried to evaluate the energy and nutrient recommendations by comparing with the actual intakes ..

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## Conference

1. **Nguyen Huong Giang**, Nguyen Mai Phuong, Nguyen Van Diep, Nobuko Sarukura, Hitomi Takeichi, Ayami Sano, Sumiko Kamoshita, Yoko Ozaki, Saori Okushima, Hitoshi Iizuka, Masayo Kaneda, Shigeru Yamamoto. *Judging From Body Weight and Energy Intake, Japanese Energy Recommendation for Children Maybe Too High*. Asian Congress of Dietetics 2022.

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**[ACD 2022] Notification of Poster Acceptance**  
3 messages

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**ACD2022 Program Office** <acd2022-p@jtbcom.co.jp>  
To: "giang3900@gmail.com" <giang3900@gmail.com>

Tue, Apr 19, 2022 at 9:15 AM

Dear Ms. Giang Nguyen,

We would like to take this opportunity to express my sincere thanks to you for submitting your abstract to the 8th Asian Congress of Dietetics (ACD 2022).

On behalf of the Program Committee, we are pleased to inform you that your following abstract has been accepted for **poster session**. Also, your abstracts will appear in the online abstracts to be published during the congress.

Abstract Reference No.: **0153**

Abstract Title: **Judging From Body Weight And Energy Intake, Japanese Energy Recommendation For Children Maybe Too High.**

**[Poster Viewing & Discussion]**

Poster sessions will be held by using an interactive virtual event platform. No poster will be displayed at the onsite venue.

Congress participants can view the posters above on the virtual platform.

There is NO opportunities of the oral presentation by poster presenters (presenting authors).

All presenting authors are required to come to the congress venue in Yokohama for the discussion time as follows.

Poster No.: **PS-10-1**

Poster Topic: **Public Health Nutrition**

## Symposium

*Japanese School Meals: A Perspective from Vietnamese Dietitians.* Asian Congress of Dietetics 2022.

