

Effect of Panang Curry Recipe Modification on Nutritional Values, Sensory Acceptability, and Purchasing Decision

Pattamaporn Jaroennon*, Sakunta Manakla*, Jutawan Nuanchankong*,
Sujarinee Sangwanna* and Charinan Jaengklang**

* Faculty of Science and Technology, Valaya Alongkorn Rajabhat University

** Faculty of Science and Technology, Bansomdejchaopraya Rajabhat University

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Abstract

This research aimed to compare the nutritional values, sensory acceptability and purchasing decision between the regular and modified recipes of Panang curry. The modified recipe was adjusted from the regular recipes by replacing coconut milk with cereal coconut milk, reducing shrimp paste and increasing herbs and spices. After the recipe modification, the nutritional values of 200 g of samples of two recipes were analyzed using the nutritional analysis program (INMUCAL-Nutritions version 4.0, Institute of Nutrition, Mahidol University). Total energy of modified recipe (397 kcal) was lower than that of the regular recipe (488 kcal). The total energy percentage of the modified recipe was comprised of carbohydrate (18.0 %), protein (25.0 %) and Lipid (57.0 %).

Moreover, the modified recipe was lower in saturated fatty acid, cholesterol and sodium than the regular recipe. The sensory acceptability and purchasing decision were assessed by 20 volunteers using the 9-point hedonic scale and five-point hedonic scale, respectively. The result showed no significant differences between the modified recipe (8.65 ± 0.73) and regular recipe (8.74 ± 0.81) in overall acceptability score ($p > 0.05$). moreover, the regular and modified recipes of Panang curry were of high purchasing scores (4.70 ± 1.09 and 4.36 ± 0.89 , respectively). This result indicated that the modified recipe could replace the regular recipe as a healthier alternative.

Keywords: Panang curry, nutritional value, sensory acceptability, purchasing decision

Introduction

Thai cuisine has gained popularity around the world because of its unique appearance, harmonious blend of flavors, aromas and health benefits. One of most well-known dishes is Panang curry (Singsomboon, 2015). The common herbs of Panang curry paste include chili, shallot, garlic, lemongrass, galangal, coriander root, coriander seeds, kaffir lime rind, fennel and pepper with add shrimp paste, coconut milk and meat (Kanchanakunjara et al., 2015; Sirisomboon & Nawayon, 2016). These herbs and spices not only enhance the flavor, aroma, and color, but they can also boost immunity and protect from acute and chronic diseases such as inflammatory, cancer, cholesterol and high blood pressure (Thakur & Sharma, 2018; Guldiken et al., 2018). Many lines of evidence suggest that these spices and herbs possess antioxidant, anti-inflammatory, antitumorigenic, anticarcinogenic, and glucose- and cholesterol-lowering activities as well as properties that affect cognition and mood reviewed in Jiang, 2019. However, the recipe also contains shrimp paste, which contains a higher amount of or sodium chloride to prevent deterioration and food poisoning. High dietary sodium consumption is associated with high blood pressure, which is a major risk factor for cardiovascular diseases (Nitipong, Kamonwan, & Teeraporn, 2020). In addition, coconut milk added to the curry contains a high saturated fatty acid content (Amirah, 2020). The major medium chain fatty acid consists of lauric acid, capric acid and caprylic acid, contributing increased blood cholesterol levels, low-density lipoprotein, and risk for cardiovascular disease (Abdullah et al., 2018; Briggs, Petersen, & Kris-Etherton, 2017).

This study aimed to modify the Panang curry recipe to increase the nutritional values while maintaining the consumer acceptance. This was accomplished by adopting the guideline for adapting recipe is reducing and replacing ingredients including coconut milk with cereal coconut milk (Marcus, 2013). Cereal coconut milk derived from rice bran oil contains several phytochemical compounds such as tocotrienols, tocopherols, phytosterols, polyphenols, squalene, and gamma-oryzanol that were reported to benefit human health (Pongpian & Panpraneecharoen, 2019). The nutritional values, sensory acceptability and purchasing decision between regular and modified recipes were used as main parameters for the comparison.

Materials and methods

Modification of Panang curry recipe

Table 1 Panang curry ingredients of regular and modified recipes (for 5 serving)

Ingredients	Regular recipe	Modified recipe
Main ingredients		
Chicken thigh (g)	500	-
Chicken breast (g)	-	500
Coconut milk (mL)	500	-
Cereal coconut milk (mL)	-	500
Fish sauce (tsp)	1	0.5
Palm sugar (tbsp)	1	0.5
Kaffir lime (leaves)	5	5
Red chili (seed)	2	2
Basil (leaves)	5	5
Curry paste ingredients		
Dried chili (seed)	10	10
Shallot bulbs (tbsp)	5	7.5
Garlic (tbsp)	4	6
Lemon grass (tbsp)	1	1.5
Galangal root (tsp)	1	1.5
Kaffir lime (tsp)	1	1.5
Coriander root (tbsp)	1	1.5
Black pepper (seed)	10	15
Coriander seed (tbsp)	1	1.5
Fennel (tsp)	1	1.5
Peanut (tbsp)	4	6
shrimp paste (tsp)	1	0.5
Salt (tsp)	1	0.5

The Panang curry recipe was adjust and labelled as “modified”. The ingredients of the curry were bought at Talaadthai market, Phatumtani province, Thailand. Then the ingredients

were cleaned and prepared. The Panang curry ingredients of the regular and modified recipes are shown in Table 1. The main ingredients, chicken thigh and coconut milk were replaced with chicken breasts and cereal coconut milk (made from rice bran oil), respectively. The curry paste were modified by increasing the amount of spices or herbs (0.5 of times), including shallot bulbs, garlic, lemon grass, galangal root, bergamot peel, coriander root, coriander seed, caraway, peanut. Fish sauce, palm sugar, shrimp paste and salt were reduced by 0.5 times.

The ingredients of curry paste were pounded thoroughly using mortar and pestle. Two tablespoons of the prepared curry paste were mixed with chicken. Coconut milk or coconut milk substitute were simmered and curry paste were added. After frying until fragrant, chicken, palm sugar, fish sauce were added and simmered for 7-10 minutes. The serving was decorated with Kaffir lime, Basil and Red chili.

Nutritional values of Panang curry recipes

Nutritional values of 200 grams (1 serving) of the regular and modified recipes were compared using the nutritional analysis program (INMUCAL-Nutritions version 4.0, Institute of Nutrition, Mahidol University). The data were presented in forms of energy (Kcal), sugar (g), protein (g), sugar (g), dietary fiber (g), vitamin (mg) and mineral (mg) contents.

Sensory acceptability test and purchasing decision of Panang curry recipes

The regular and modified Panang curry recipes were compared based on the sensory acceptability test and purchasing decision. The samples were evaluated by 20 volunteers who can eat food containing spices. Volunteers were students of Valaya Alongkorn Rajabhat University under the Royal Patronage who consented to join this study. The samples were labeled with three litter-digit randomized codes before serving to volunteers. The appearance, odor, taste, viscosity (liquid phase) and overall acceptability of samples was assessed using the 9-point hedonic scale (1: extremely dislike to 9: extremely like). Volunteers were also questioned about the purchasing decision of two recipes using the five-point hedonic scale (1: definitely would not buy, 5: definitely would buy).

Data analysis

Results from nutrition data, sensory acceptability test and purchasing scores were reported as mean \pm standard deviation. Independent t-test was applied to determine the differences of sensory scores and purchasing scores between the regular and modified recipes.

Results and discussions

Nutritional values of Panang curry recipes

Table 2 Nutritional values of the regular and modified Panang curry recipes (1 serving or 200 g)

Nutritional values	Panang Curry	
	Regular recipe	Modified recipe
Carbohydrate (g)	13.8	18.3
% of total energy	11.0	17.0
Protein (g)	21.3	24.4
% of total energy	18.0	25.0
Fat (g)	38.7	25.3
% of total energy	71.0	57.0
Total Saturated Fatty acid (g)	23.6	3.7
% of Thai DRI	43.5	8.4
Cholesterol (mg)	58.0	50.0
% of Thai DRI	19.3	16.7
Sugars (g)	4.8	3.3
% Thai DRI	3.9	3.3
Dietary fiber (g)	6.9	11.4
% Thai DRI	27.6	45.6
Sodium (mg)	685.1	488.9
Calcium (mg)	85.1	87.5
Iron (μ g)	3.5	3.4
Vitamin C (μ g)	27.9	36.3
Total energy (kcal)	488	397

Nutritional values of the regular and modified Panang recipes are shown in Table 2. The results indicated that most of the total energy percentage of regular recipe was from fat (71%). After modifying the Panang curry recipe, the total energy percentage of fat was reduced to 57%. Moreover, the modified recipe contained less total saturated fatty acid (3.7 g, 8.4% of Thai DRI) and cholesterol decreased (50.0 g, 16.7% of Thai DRI) compared to the regular recipe (23.6 g, 43.5% of Thai DRI) and (58.0 g, 19.3 % of Thai DRI), respectively. The saturated fatty acid and cholesterol are root causes of various health issues such as cardiovascular diseases

and obesity-related type 2 diabetes (Gershuni, 2018). The lower level of fatty acid and cholesterol of the modified recipe was mainly due to replacing coconut milk with cereal coconut milk. Rice bran oil contains several phytochemical compounds such as tocotrienols, tocopherols, phytosterols, polyphenols, squalene, and gamma-oryzanol that are beneficial to human health (Pongpian & Panpraneecharoen, 2019). Furthermore, the modified recipe was higher in protein, carbohydrate, calcium and vitamin C, and lower in energy (397 kcal vs. 488 kcal, Table 2). The higher dietary fiber of the modified recipe (11.4 g) was likely due to the increase in spices and herbal contents. In addition, the modified recipe was lower in sodium because of the reduction of salt, shrimp paste and fish sauce and is likely to reduce the risk of hypertension (Nitipong, Kamonwan, & Teeraporn, 2020).

Sensory acceptability of Panang curry recipes

The sensory acceptability of the regular and modified recipes is shown in Table 3. The result showed that the appearance and odor of regular recipe displayed a significantly higher score than that of the modified recipe ($p \leq 0.05$). This was likely due to more spices and herbs were added to the modified recipe, resulting in a stronger smell and darker color. The taste of two recipes was not significantly different, indicating that replacing coconut milk with cereal coconut milk and increasing spices in modified recipe did produce any differences in taste. It was also found that the regular recipe was more viscous than the modified recipe possibly due to the higher fat content (Amirah, 2020). However, the modified recipe (8.65 ± 0.73) and regular recipe (8.74 ± 0.81) had no significant differences in overall acceptability score ($p > 0.05$). This result suggested that the modified recipe was preferred as the regular recipe. Therefore, we concluded that the modified recipe was a suitable candidate for a healthy Panang curry.

Table 3 Sensory characteristics of the regular and modified Panang curry recipes

Characteristics	Regular recipe	Modified recipe
Appearance	$8.64 \pm 0.89^*$	$8.30 \pm 0.92^*$
Odor	$8.14 \pm 0.89^*$	$8.05 \pm 0.76^*$
Taste	8.34 ± 0.89	8.30 ± 0.92
Viscosity (Liquid phase)	$8.84 \pm 0.61^*$	$8.65 \pm 1.09^*$
Overall acceptability	8.74 ± 0.81	8.65 ± 0.73

Asterisks denoted significant difference in preference score between regular and modified Panang curry recipes ($*p \leq 0.05$)

Purchasing decision of the Panang curry recipes

Purchasing decision of the Panang curry recipes is shown in Table 4. The result suggested that the regular recipe (4.70 ± 1.09) received a significantly higher purchasing decision than the modified recipe (4.36 ± 0.89). However, the two recipes of Panang curry were of a high purchasing score. This result indicated that the modified recipe has the potential to be developed commercially. Asterisks denoted significant difference in purchasing score between regular and modified Panang curry recipes; $*p\leq 0.05$

Conclusion

This study compared the nutritional values, sensory acceptability and purchasing decision of the regular and modified Panang curry recipes. The nutritional values of the modified recipe contained lower energy than of that regular recipe. The modified recipe was also lower in fat and energy but higher in protein and carbohydrate. In particular, the saturated fatty acid in the modified recipe was lower. Sodium content was decreased in the modified recipe, while vitamin C and calcium increased. The consumer acceptability of the regular and modified recipes was high in all characteristics, leading to a high score in purchasing decision. Overall, the modified recipe is offered a healthier alternative without significant effect on the consumer acceptability.

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