Consumers' Acceptance of Chicken Green Curry with Soymilk in Bangkok

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บทคัดย่อ

กะทิเป็นส่วนประกอบหลักของแกงเขียวหวานไก่ไทยซึ่งกะทิมีไขมันเป็นองค์ประกอบอยู่สูง การบริโภคอาหารที่มีไขมันสูงเป็นการเพิ่มความเสี่ยงต่อการเกิดโรคไม่ติดต่อเช่นโรคหัวใจและโรคอ้วน นมถั่วเหลืองมีคุณค่าสารอาหารที่เป็นประโยชน์คือมีโปรตีนสูงแต่มีไขมันต่ำ การเตรียมนมถั่วเหลืองโดยใช้สัดส่วนของถั่วเหลืองต่อน้ำที่เหมาะสมทำให้นมถั่วเหลืองมีคุณลักษณะทางเนื้อสัมผัสใกล้เคียงกับกะทิ อย่างไรก็ตามกลิ่นเฉพาะของถั่วเหลืองอาจมีผลต่อการบริโภคของผู้บริโภคบางคน จุดประสงค์ของการศึกษาวิจัยแบบภาคตัดขวางนี้คือเพื่อประเมินการยอมรับของผู้บริโภคในเขตกรุงเทพมหานคร ประเทศไทยที่มีต่อแกงเขียวหวานไก่ที่ใช้นมถั่วเหลืองทดแทนกะทิ การเตรียมนมถั่วเหลืองใช้สัดส่วนถั่วเหลืองต่อน้ำคือ 1 ต่อ 5 การทำแกงเขียวหวานไก่ใช้พริกแกงเขียวหวานสำเร็จรูปและนมถั่วเหลืองที่เตรียมไว้ ทำตามวิธีทำแกงเขียวหวานของตำรับอาหารไทย โดยเตรียมแกงเขียวหวานไก่ใหม่ทุกครั้งที่ทำการสำรวจข้อมูล ผู้บริโภคตอบแบบสอบถามและให้คะแนนการยอมรับทางประสาทสัมผัสแบบ 9-point hedonic scale วิเคราะห์ข้อมูลที่ได้โดยใช้สถิติเชิงพรรณา ผลการศึกษาพบว่าผู้บริโภคให้การยอมรับแกงเขียวหวานไก่ที่ใช้นมถั่วเหลืองโดยรวมอยู่ในระดับชอบมาก นอกจากนี้กลิ่นเฉพาะของนมถั่วเหลืองไม่มีผลต่อการยอมรับแกงเขียวหวานไก่ของผู้บริโภค ลักษณะปรากฏและเนื้อสัมผัสของแกงเขียวหวานที่ใช้นมถั่วเหลืองทดแทนกะทิมีความคล้ายคลึงกับแกงเขียวหวานที่ใช้กะทิ จากการศึกษานี้แสดงให้เห็นว่ามีความเป็นไปได้ในการใช้นมถั่วเหลืองทดแทนกะทิในการทำแกงเขียวหวาน และแกงเขียวหวานที่ใช้นมถั่วเหลืองทดแทนกะทินี้จัดเป็นอาหารเพื่อสุขภาพอีกทางเลือกสำหรับผู้บริโภค

คำสำคัญ: นมถั่วเหลือง แกงเขียวหวานไก่ กะทิ

Abstract

Coconut milk, the main ingredient in Thai chicken green curry, has been known to contain high amounts of fat. Consumption of high fat foods could lead to high risks of non-communicable diseases such as cardiovascular disease and obesity. Soymilk is a nutritious food high in protein but low in fat content. It is similar in texture to coconut milk when using the optimum ratio of soybean to water. However, the specific odor of soybean may affect some consumers. The purpose of this cross-sectional study was to examine the acceptance by consumers in Bangkok, Thailand of chicken green curry using soymilk as a substitute. Proportions of 1 to 5 of soybean to water were used in the soymilk preparation. The Thai traditional chicken green curry was freshly prepared with green curry paste and soymilk by using a domestic-style method. Participants completed a questionnaire and sensory test of the green curry using a nine-point hedonic scale. The data were analyzed by descriptive statistics. Results showed that the overall preference of the chicken green curry with soymilk was in the 'like very much' category.

In addition, the soymilk odor did not influence the consumers' acceptance of the green curry. The appearance of the green curry and its texture were similar to those of the original curry. Using soymilk for chicken green curry is a possibility and should be considered as an option for healthy food.

Keywords: Soymilk: Chicken green curry: Coconut milk

Introduction

Coconut milk, a white opaque liquid, is an emulsion of natural oil in water [1] and is the main ingredient in Thai chicken green curry. It is known to contain high amounts of fat and the consumption of high fat foods can lead to high risks of non-communicable diseases such as cardiovascular disease and obesity. Soymilk is a nutritious food high in protein but low in fat content [2]. It is similar in texture to coconut milk when using the optimum ratio of soybean to water. Replacement of coconut milk with soymilk in the preparation of Thai chicken green curry was successfully completed in the researchers' laboratory [3]. However, some soymilk characteristics differed from coconut milk, especially the specific odor of soybean, sometimes affecting consumers' acceptance in home cooking. The purpose of this cross-sectional study was to examine consumers' acceptance of chicken green curry using soymilk as a substitute for coconut milk in a domestic-style preparation in Bangkok, Thailand.

Materials and methods

This research of consumers' acceptance of Thai chicken green curry using soymilk as a replacement for coconut milk was performed in a cross-sectional designed study. It was carried out from October to November in 2009 and the consumers were Thais who stayed in Khet Chatuchak in the north area of Bangkok during the study period by use of convenience non-random method and non-probability selection [4]. The sample size was calculated at 95% of confidence interval by the following equation [5]:

$$n_0 = Z^2pq/e^2$$

where n_0 is the sample size, Z is the sample error at 0.05 of confidence coefficient which is 1.96, e is an error which is 0.05, p is an estimation of sample proportion from a preliminary interview of green curry consumers in Bangkok which was calculated by the ratio of the number of green curry consumers to the total number of consumers, which was 0.92, and q is the difference of 1 by p. The sample size that resulted from the calculation was 113 persons. However, this study was completed with 120 consumers who were more than 30 years old and differed in their consumption behavior of green curry and soymilk.

Data collection

Participants consumed warm cooked green curry and warm cooked rice (50 and 10 grams respectively) and completed the questionnaire. The portions of the curry constituents, such as chicken, Thai eggplant, and curry soup, were the same for each serving. The questionnaire was composed of 2 parts, consumption behaviors in regard to green curry and soymilk, and a nine-point hedonic scale sensory test. The participants completed their general characteristics in the questionnaire and questionnaires were checked by an interviewer for correct completion.

Soymilk preparation

Soy seeds (Chiangmai 60 variety) were cleaned and soaked in water for 2 hr at room temperature. They were blended with water in the ratio of 1 to 5 of soy to water for 3 min using a blender. Soymilk mixed together with slurry was filtered through cheesecloth to receive the raw soymilk.

Chicken green curry preparation

Original green curry paste, Mae-Bam-Roong brand, was added with bergamot peel, ground coriander seed, and ground tree basil in a ratio of 97.09%, 0.97%, 0.97% and 0.97% respectively to produce 100 g of green curry paste. This was stir-fried with soy oil and chicken for 2 min in a pan. Thai eggplants and Turkey berries were added and stir-fried for 3 min. Fish sauce, sugar, and the remaining ingredients were mixed in the pan and well stir-fried for 3 min. After that, warmed soymilk at approximately $90^{O}C$ was poured into the stir-fried ingredients. Types, quantities, and ratios of ingredients used in the chicken green curry are shown in Table 1.

Table 1 Ingredients of chicken green curry [6]

Ingredients	Quantity (g) (%)
Chicken meat	400 (32%)
Turkey berry	100 (8%)
Thai eggplant	400 (32%)
Bergamot leaf	15 (1%)
Thai basil	15 (1%)
Cayenne pepper	10 (1%)
Fish sauce	90 (7%)
Sugar	5 (6%)
Soy oil	40 (3%)
Green curry paste	110 (9%)

Statistical analysis

Data were analyzed by descriptive statistics in terms of amounts and percentages. The chi-square technique was used for relation analysis between consumers' characteristics and acceptance of the green curry. The significant degree of differences was established at p-value ≤ 0.05.

Results and discussion

Characteristics of consumers

Consumers in this study lived in North Bangkok, Thailand during October to November, 2009. Most were female (66.7%). Regarding ages, educational degrees, and occupations, 35.8% were more than 61 years old, 47.1% had a bachelor degree, and 51.3% worked as a housewife or househusband. Just under half (46.6%) were healthy without non-communicable diseases. The characteristics of consumers are presented in detail in Table 2.

Consumption behavior of consumers of green curry and soymilk

As presented in Table 3, the majority of the consumers (67.5%) consumed green curry one or two times per month. However, green-curry eating as a set menu served with rice or Thai fermented noodle (Ka-Nhom-Jeen and a variety of Thai foods might be a cause of limiting green-curry eating daily. Most of the consumers (73.6%) drank soymilk every week, ranging from 1 to more than 4 times per week, indicating that it is a popular beverage for Thai people and well-accepted in terms of flavor and texture. This consumption behavior suggested that green curry and soymilk were well acknowledged by consumers.

Table 2 General characteristics of consumers

Characteristics	Consumers (%)	Green curry consumers (%)[1]	Soymilk consumers (%)[1]
Number of consumers	120 (100)	117 (97.5)	117 (97.5)
Age (years)			
30-40	10 (8.3)	8 (6.8)	10 (8.5)
41-50	35 (29.2)	35 (29.9)	35 (29.9)
51-60	32 (26.7)	32 (27.4)	30 (25.6)
> 60	43 (35.8)	42 (35.9)	42 (35.9)
Education[1]			
Non-educated	1 (0.8)	1 (0.9)	1 (0.9)
Primary school	11 (9.2)	11 (9.5)	11 (9.5)
Secondary school	7 (5.9)	6 (5.2)	7 (6.0)
High school	10 (8.4)	10 (8.6)	10 (8.6)
Diploma	18 (15.1)	18 (15.5)	17 (14.7)
Bachelor degree	56 (47.1)	56 (48.3)	55 (47.4)
Master degree	11 (9.2)	9 (7.8)	10 (8.6)
Other	5 (4.2)	5 (4.3)	5 (4.3)
Occupation[1]			
Housewife/Househusband	61 (51.3)	60 (51.7)	59 (50.0)
Public servant	10 (8.3)	10 (8.6)	10 (8.6)
State enterprise officer	6 (5.0)	6 (5.2)	6 (5.2)
Private company officer	8 (6.7)	6 (5.2)	8 (6.9)
Owner employed	28 (23.3)	28 (24.1)	28 (24.1)
General employee	5 (4.2)	5 (4.3)	5 (4.3)
Health condition[2]			
High pressure	27 (22.9)	27 (23.5)	26 (22.2)
Hypercholesterolemia	13 (11.0)	13 (11.3)	12 (10.4)
Diabetes mellitus	14 (11.9)	14 (12.2)	14 (12.2)
Obesity	4 (3.3)	4 (3.5)	4 (3.5)
Osteoarthritis	9 (7.6)	9 (7.8)	9 (7.8)
Allergy	15 (12.7)	15 (13.0)	15 (13.0)
Cardiovascular disease	6 (5.1)	6 (5.2)	6 (5.2)
Healthy	57 (48.3)	54 (47.0)	56 (48.7)

[1] Missing data

[2] More than one of non-communicable disease was found in some consumers

Consumption behavior of consumers of green curry and soymilk

As presented in Table 3, the majority of the consumers (67.5%) consumed green curry one or two times per month. However, green-curry eating as a set menu served with rice or Thai fermented noodle (Ka-Nhom-Je and a variety of Thai foods might be a cause of limitinf of green-curry eating daily. Most of the consumers (73.6%) drank soymilk every week, ranging from 1 to more than 4 times per week, indicating that it is a popular beverage for Thai people and well-accepted in terms of flavor and texture. This consumption behavior suggested that green curry and soymilk were well-acknowledged by Thai consumers.

Table 3 Number and percent of consumers regarding consumption behavior of green curry and soymilk

Green curry[1]		Soymilk[1]	
Consumption	**Number of consumers (%)**	**Consumption**	**Number of consumers (%)**
1-2 times/month	79 (67.5)	1-2 times/week	32 (27.4)
3-4 times/month	27 (23.3)	3-4 times/week	25 (21.4)
>4 times/month	11 (9.4)	>4 times/week	29 (24.8)
-	-	1-2 times/month	31 (26.5%)

[1] Total number of consumers was 117 for green curry and soymilk.

Table 4 Consumers' reasons for eating and not eating green curry[1]

Reasons for eating green-curry	**Number of consumers (%)**	**Reason for not to eating green-curry**	**Number of consumer (%)**
Nutritional and health benefit	56 (48.2)	Taste	19 (16)
Spices odor	34 (29.3)	Oily flavor and fatty feel	34 (28.6)
Appearance	14 (12.1)	High fat content	77 (64.7)
Convenience	104 (89.6)	Cholesterol	58 (48.7)
Delicious	19 (16.4)	High calorie	10 (8.4)
Inexpensive	10 (8.6)	Difficulty of cooking	14 (11.8)

[1] More than one reason could be selected by consumers

Table 4 presents consumers' reasons for eating and not eating green curry. Information received from the questionnaires revealed that convenience (89.6%) and high fat content (64.7%) were major reasons for eating and not to eating green-curry respectively. It should be noted that fat from coconut milk in green curry influenced consumers in sensory and nutritional aspects. The health benefit of soymilk was the main reason for consumers' choice (Table 5). This information suggested that consumers were strongly concerned about the nutritional value of foods. However, convenience was an important reason for the consumption behavior of Thai people.

Table 5 Consumers' reasons for drinking soymilk[1]

Reason for soymilk drinking	Number of consumers (%)
Cheap	19 (16.1)
Convenience for purchase	30 (25.4)
Delicious	30 (25.4)
Health benefit	99 (83.9)

[1] More than one reason could be selected by consumers

Consumers' acceptance of chicken green curry using soymilk as a substitute

As shown in Table 6, overall assessment of chicken green curry prepared with soymilk was in the 'like very much' category. Acceptances of odor and taste were at the 'like' level, suggesting that soymilk odor did not influence the consumers' acceptance of the green curry. It should be noted that the consumers were not able to detect the replacement of coconut milk with soymilk. Adding more bergamot peel, ground coriander seed, and ground tree basil may improve the odor of the curry. In addition, consumers' acceptance of appearance, color of soup, and texture of soup ranged from 'like moderately' to 'like very much.' This suggested that the modified green curry was similar in characteristics to the original green curry and the ratio of soy seeds to water (1 to 5) was appropriate for cooking chicken green curry in a domestic context.

Table 6 Sensory test scores of chicken green curry preparation with soymilk

Characteristics	Acceptability level	Mean $\pm$ SD
Appearance	Like very much	7.0 $\pm$ 1.5
Odor	Like moderately	6.4 $\pm$ 1.6
Taste	Like moderately	6.5 $\pm$ 1.4
Color of soup	Like very much	7.2 $\pm$ 1.4
Viscosity of soup	Like moderately	6.6 $\pm$ 1.8
Total acceptability	Like very much	7.1 $\pm$ 1.2

The relationships of the consumers' general characteristics and the acceptance of chicken green curry made with soymilk were evaluated. It was found that consumers' ages, educational levels, and occupations were not related to the consumers' acceptance of green curry. The high acceptability by the consumers of the green curry made with soymilk is probably due to their consumption behaviors for original green curry and soymilk as shown in Table 3. In addition, the consumers' acceptance may be due to the health benefit of soymilk as a result of the reductions of fat content and calories.

Conclusion

The replacement of coconut milk with soymilk in Thai chicken green curry was well-accepted by the consumers. Modified green curry should be considered as a healthy menu for Thai consumers concerned with the nutritional value of food menus and health.

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