

Towards Making Wholesome Kottu: Common Recipes and Serving Numbers of Food Groups

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Abstract

Kottu has now become an inseparable component of Sri Lankan food culture and is among the few food items that has gained international recognition as a Sri Lankan cuisine. In order to make kottu healthier and nutritionally acceptable, its' basic nutritional facts need to be ascertained. This study 1) determined the basic recipes of popular types of kottu and 2) compared the serving numbers of different food groups of a typical kottu with the standards set out in Food Based Dietary Guidelines for Sri Lankans. Information was collected from 36 urban and peri-urban Kottu making places in Galle and Matara Districts, using a structured type questionnaire and informal discussions. An average kottu weighed 533 g which comprised of 253 g of wheat flour based rotti, 1 egg, 117 g of meat and 167 g of vegetables+ condiments +oil (carrot, 45 g; leeks 48 g; onion 20 g; green chili 5 g; salt 6 g; oil 10 ml; soy source 10 ml; chili and pepper mix 14 g and garlic and ginger mix 10 g). A typical kottu provides 5 cereals, 1.4 vegetable, 4.9 meat, egg, fish and pulses and 0.66 nut and oil servings and thus the consumption of an average kottu fulfills 63%, 35%, 140% and 16% of recommended daily serving numbers of the respective food groups. An average kottu accounts for 62% of the maximum daily cholesterol intake level and contains more than 6 g of salt. The study identifies kottu as a good mean of serving vegetables. High cereal, protein, salt and cholesterol contents were identified as the negative nutritional and health issues related to kottu. Importance of reducing protein fraction, use of whole wheat flour as the starchy base, increase of the amount and the variety of vegetables and, serving of fruits and dairy with kottu is highlighted to make kottu nutritionally more acceptable and attractive.

Keywords: Food, groups, Hygiene, Kottu, RDA, Servings

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Introduction

Though not considered a traditional food item, kottu or kottu rotti is now become a strong component in Sri Lankan food culture. During early to mid-1990s kottu was mainly popular among low and low-middle income earning social segments in urban and peri-urban areas. Now kottu has become a choice of higher social segments and available in star rated hotels and restaurants as well. A recent study done with a sample of 300 people, we found that 62 % of the respondents preferred kottu while only 23% disliked (Atapattu *et al.*, unpublished data). The preference for kottu was found to be more or less similar to that for fried rice. Now kottu is popular in some European and North American countries as well. In terms of its popularity, kottu is sometimes referred to as Sri Lankan version of hamburger. Furthermore, kottu has gained global recognition as a Sri Lankan food item (wikipedia.org/wiki/Kottu#cite_note-5; last accessed 19th Dec 2016).

Locally kottu is popular due to its convenience and all-in-one nature. Furthermore, kottu offer a greater level of flexibility in ingredient composition, if a customer wishes. Despite its

popularity, there are many concerns about kottu. Some criticize kottu for its nutritional imbalance and possible inclusion of artificial flavours and additives. Some concern about the hygienic standards of the whole process of kottu preparation.

In order to make kottu nutritionally and hygienically acceptable and to showcase kottu as a food item with unique Sri Lankan identity, the whole process of kottu preparation needs to be standardized and fine-tuned. In this context, basic nutritional information about kottu and its preparation process are of essential. That information is important for relevant policy makers and authorities to identify the deficiencies and, to implement necessary corrective measures. Nutritional information will help the consumers to adjust the type, amount and even the ingredient composition of kottu they consume. Authors were unable to find any systematic study which reports the basic nutritional information about kottu. Objective of this study was to identify the ingredient composition of popular types of kottu and to compare serving numbers of different food groups of kottu against the standard set out in

Food Based Dietary Guidelines for Sri Lankans (2011).

Materials and methods

Thirty-six Kottu making places (small and medium scale hotels and restaurants) both in urban and peri urban areas in Galle and Matara Districts were visited. Information about the ingredient composition of different types of kottu, process of kottu preparations and popularity of different types of kottu were collected using a structured type questionnaire and face-face interviews with kottu makers and restaurant owners. Hygienic standards of the persons who prepare kottu, place, utensils, ingredients and overall hygienic standards were assessed using four point Likert scale. Nutritional facts about the kottu were compared against the standards set out in Food Based Dietary Guidelines for Sri Lankans (2011). Data were analyzed using MINITAB and results are presented as descriptor statistics.

Results and discussion

In making kottu, initially, a rotti is prepared using bran-free wheat flour-based dough and, then chopped. Then chopped rotti is re-chopped while mixing with a mixture of vegetables, egg and/or meat, and various spices, on a heated iron plate, using two blunt metal blades. Usually rotti, vegetables, meat and other things are prepared in morning and re-chopping while

mixing of items on a hot plate according to a specific ratio is done when a customer demands a kottu, quite often in evening or night, usually as a dinner meal.

Having regularly prepared and sold at all 36 kottu making places visited, the most popular type of kottu was the chicken, followed by egg and vegetable. Other popular kottu varieties included string hopper, noodles and cheese kottu. Beef, pork or mutton kottu were not popular in the area of this study. Kottu types prepared using rotti as the starchy base was found to be more popular than those prepared using noodles or string hoppers. As name implies, starchy bases of string hopper and noodles kottu were string hoppers and noodles, respectively. Cheese kottu was the most expensive while vegetable kottu was the cheapest. Prices of all types of kottu varied widely from place to place (Table 1). An average kottu weighed 533±42 g which comprised of 253 g of wheat flour based rotti, (either kottu, or string hopper or noodles), 1 egg, 167 g of vegetables+ condiment +oil and 117 g of meat or fish.

Food based dietary guidelines for Sri Lankans (2011) recommends that starchy base should account half to two third of a main meal. However, probably due to the higher meat and

Table 1: Ingredient composition of different types of kottu

Type of kottu	Price (Rs)	Major ingredients				Vegetable mix	Weight (g)	Condiments	g/ml
		Rotti (g)	Vegetable + Condiments (g)	Eggs	Meat/fish (g)				
Vegetable	118.00 (100-150)	258±54	165±38	-	-	Carrot	45±14	Soy sauce (ml)	10±0.2
Egg	148 (130-180)	255±52	165±38	2	-	Leeks	48±17	Salt (g)	6±0.2
Chicken	188 (160-200)	255±52	164±37	1	139±30	Cabbage	49±11	Chilli+pepper (g)	14±0.7
Cheese	250	291±87	193±74	1	100	Onion	20±12	Garlic+Ginger (g)	10±0.4
Idiappa	193 (150-250)	235±48	176±47	1	131±31	Green Chili	5	Oil (ml)	10
Noodles	183 (150-200)	246±55	168±43	1	129±28	Tomato	12±6	Stock (g)	1.0±0.4
Other (fish)	153 (130-180)	250±0	148±27	1	90±17	-	-	Aginomotto (g)	0.5
Mean		253±52	167±40	1	117±27	-	-	-	-

egg inclusion levels, starchy fraction of an average kottu accounted only 47% of the total meal. Despite lower starchy fraction than recommended, kottu can reasonably be considered a caloric rich food item because it contains bran-free wheat flour and uses oil both in dough preparation and in final cooking stage. The assumption is further supported by the fact that the consumption of one kottu alone provided 5 cereal and starchy food servings, fulfilling 63% of recommended serving number (6-11) (Table 2). Furthermore, wheat flour is low in fibre and vitamins, mainly B complex. It would be important to test whether kottu could be prepared using whole wheat flour (*atta flour*) to make kottu nutritionally more acceptable. Since a kottu exceeds the recommended protein serving suggestions (Table 2), reduction of protein fraction will also increase the starchy fraction. The number of starchy food servings of a Sri Lankan is reported to be as high as 14 (Jayawardane *et al.*, 2013) compared to the recommended maximum of 11. Therefore, a person who has consumed a kottu need to adjust his or her cereal intake considering that he has already consumed 5 out of 11 cereal servings.

It was difficult to get information about the ingredient composition of the dough from which rotti is prepared. According to those who divulged, some of them add eggs to the dough.

Therefore, though meat or eggs or fish are excluded, vegetable kottu cannot be considered a vegetarian dish since eggs may included in the preparation of kottu dough.

An average kottu contains one egg while two eggs are added in the preparation of egg kottu. Though egg is an excellent source of protein and many other nutrients (Kovacs-Nolan *et al.*, 2005), some studies have reported positive relationship between egg cholesterol intake and diseases such as cardiovascular disorders (Dawber *et al.*, 1982) and diabetes (Djousse *et al.*, 2009). An average egg contains 186mg of cholesterol (Jung-Min, 2013) and food based dietary guidelines for Sri Lankans recommends a maximum of 300 mg of daily cholesterol intake. Therefore, an average kottu accounts for 62% of safe cholesterol intake while egg kottu cannot be recommended since the consumption of one such kottu alone exceed the safe daily cholesterol intake.

The mean number of meat and pulse serving per Sri Lankan is reported to be as low as 2.78 (Jayawardane *et al.*, 2013). In contrast, consumption of normal chicken kottu containing an egg and 117 g of meat alone provides 4.9 servings of fish, pulse, egg meat category, compared to the recommended serving number of 3-4 (Table 2). Meat alone provided 3.9

Table 2: Serving numbers of different food groups of an average kottu¹

Food group	Food items	Recommended Serving	Serving Size	Intake with an average kottu		% of recommendation ¹
	Bread	6-11	50g	253	5	63.2
Vegetable	Raw salad	3-5	200 ml	282 ml ²	1.41	35
	Fish	3-4	30 g			
	Meat			117 g	3.9	140
	Egg			50 g	1	
Fruits	0.5 cup salad	2-3	200 ml	0	0	
Milk and dairy	Milk	1-2	100 ml	0	0	0
	Yoghurt cup					
Nut and oil seed	Oils, nuts, coconut milk	2-4	15g	10 ml	0.66	16.6

1. Of the mean level of recommendation.

2. Carrot 45g+ Leeks 48g + Onion 20g

servings. Therefore, to make kottu nutritionally more acceptable, it is suggested either to reduce the amount of meat added by about 30 g or to remove the egg. Since meat is more expensive than wheat, reduction of meat will reduce the cost of production and thereby the price of a kottu. Since a normal kottu alone could meet the recommended daily protein serving number, a person who has already consumed a kottu, from nutritional point of view he or she may avoid protein sources in other meals.

Food based dietary guidelines for Sri Lankans (2011) recommended 3-5 cups of 200 ml vegetable salad per day. A typical vegetable mixture used in kottu preparation contained 45 g of carrot, 48 g of leeks, 20 g of onion and 5 g of green chili. 60% and 33% of the kottu rotti makers used around 49 g of cabbage and 12 g of tomato, respectively. The amount of vegetables added to a kottu was found to be much higher than that of an average meal of a Sri Lankan (15 g/meal) (Jayawardane *et al.*, 2013). Based on FAO / INFOODS Databases Density Database Version 2.0, it was calculated that a typical kottu contains 282 ml of vegetable mixture (considering carrot, leeks and onion only) equivalent to 1.4 of servings, fulfilling 35% of the RDA of vegetables (4 serving). The number of vegetable servings in a kottu is slightly lower than the national vegetable consumption (1.78 servings/head/day), as reported by Jayawardane *et al.* (2013). Therefore, kottu seems to be a good way of increasing the vegetable intake of the people. However, it must be noted that against the general recommendations, only a limited number of vegetables was used in kottu. In order to make kottu nutritionally more acceptable, it is suggested to include a wider variety of vegetable and to increase the proportion of vegetables in place of starchy base in particular and protein fraction, to a certain extent. Increase in vegetable fraction is particularly important and in fact needs to make mandatory for vegetable kottu since it does not contain higher amount of vegetable compared to other types.

There is a general view that some potentially harmful additives are added into the condiment mixture to make kottu tastier. A typical condiment mixture contained 10 ml of soy source, 10 ml of coconut oil, and 14 g of chili and

pepper mix, 10 g of garlic and ginger mix and 6 g of salt. Apart from what added to the meat and dough, 6g of salt is added at the time of cooking, exceeding the daily maximum recommended level of 5 g. Therefore, careful attention is required to minimize the salt level of kottu. Despite the wide-spread concerns, only one kottu maker admitted that monosodium glutamate is used (0.5 g). As a substitute 40% of them used a chicken stock powder.

Confirming general negative attitude about the hygienic standards of kottu, overall assessment on the hygienic condition of the kottu preparation was rated "bad" or "very bad" in 63% of the places visited (Table 3). Particularly, the hygienic condition of the utensils used the persons who prepared kottu and ingredient needed improvements to raise the hygienic conditions to an acceptable level. Contrary to well established recommendation that eggs should be broken and collected to a separate container and then include into cooking mixture, all the kottu makers simply broke the eggs and poured the contents into the kottu mixture. The standard practice while ensuring hygienic standards can be used to regulate the egg inclusion level in fractions of an egg, of a kottu. Furthermore, attention should be given to nutritional and hygienic standards of the supplementary curry or gravy that offer with a kottu.

Food based dietary guidelines recommends ideal serving numbers for six food groups for healthy

Table 3: Hygienic standards at the different points of the kottu preparation process

point	Acceptable or above	Bad/Very bad
Shop	50	50
Person	27	73
Place	50	50
Utensils	17	83
Ingredients	40	60
Overall	37	63

diet; 1). cereals and tubers, 2). vegetables, 3). fish, pulses, meat and egg 4). fruits 5). milk and dairy products and 6). nuts and oils. Though expensive, cheese kottu seems to be better than other types since it included all food groups, except fruits. Vegetable kottu lacks meat and normally a fruit and dairy products are not considered as a part of a kottu meal. Therefore, it seems to be advantageous to search creative means of including servings of those groups as components of a kottu meal. For example, inclusion of a slice of pineapple with normal or cheese kottu and addition of some fruits such as pineapple and plums will make kottu more nutritionally acceptable and attractive to a wider range of customers.

Conclusion

An average kottu was found to exceed the number of meat, fish, egg and pulse servings than recommended while contributing disproportionately higher number of cereal servings. Attention needs to be given to address the higher cholesterol and salt levels of kottu and poor hygienic standards of kottu preparation. Kottu is recommended as a good mean of delivering vegetables. Reduction of protein fraction, use of whole wheat as the starchy base, increase the amount and the varieties of vegetables used, and serving of fruits and dairy with kottu are proposed to make kottu nutritionally more acceptable and attractive.

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