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Cost assessment for healthy diet in the state of Penang, Malaysia

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Abstract

Background: Despite the critical peril of deteriorating well-being of the Malaysian population, there remains lack of information related to the cost assessment of eating a healthy diet. Within this context, the current study addresses the issue of affordability of healthy eating in Malaysia by calculating the direct cost of healthy eating options provided by the Malaysian Dietary Guidelines. **Methods:** The study was designed as a once-only, time-based walk-in survey. Three supermarkets located in the center of the Penang city were targeted for data collection. The examples provided by the Malaysian Dietary Guidelines for a one-day menu for 1500, 2000 and 2500 kcal were used for cost calculation. Worksheets were used for data collection and the data was later transferred to SPSS v 18 for analysis. Based on the objectives of the study, the data was described descriptively and average spending for a month was calculated. **Results:** Healthy eating was reported 'unaffordable' as on average, an individual following a 1500 kcal menu needed RM 845.50 (US \$191.50) each month in order to stay healthy. Furthermore, those following 2000 and 2500 kcal menu plan had to spend RM 1062.30 (US \$240.75) and RM 1437.60 (US \$325.80) to consume healthy diet respectively. **Conclusions:** Affordability shaped as a major barrier towards healthy eating in the state of Penang, Malaysia especially for households having low and middle income. The findings are of particular importance because the immediate and long-term consequences of unhealthy diet are comprehensive and can influence lifelong practices. **Key words:** Cost, Assessment, Healthy diet, Malaysia, Affordability, Nutrition.

INTRODUCTION

The past two decades witnessed a transition in nutrition selection, whereby a strident shift among dietary patterns was observed.^[1] This nutritional transition in addition with sedentary lifestyles resulted in an increased prevalence of obesity worldwide.^[2] Since then, obesity became a serious health concern resulting in the development of multiple chronic diseases.^[3-5] Among numerous interventions to control increasing obesity rates, healthy diet and lifestyle modification are frequently highlighted in the literature.^[6,7] Consequently, healthy eating is becoming a growing concern and intake and practice of healthy diet is identified as a precedence for reducing diet-related chronic diseases and weight-related disorders.^[8]

Within the context of increased obesity and pervasiveness of diet-related chronic diseases, Malaysia is not an exception. Malaysia being a rapidly growing nation is affected



by westernization of eating habits.^[9] Modern lifestyle, the tendency of outdoor food consumption and irregular meal habits are comprehended as a general norm among Malaysians. From local restaurants to international chains, the fast food sector was reported as a preferred choice of Malaysians with 67% growth in 5 years.^[1] The popularity and availability of junk food, sedentary lifestyle and dietary transference resulted in a rapid increase of obesity in the Malaysian population. In 2010, Malaysia was ranked sixth in the Asia-Pacific region for obesity and was at the top in South-East Asia for both obesity and diabetes.^[10] In line with what being reported earlier, the National Health and Morbidity Survey in 2011 reported 33.3% of the Malaysian as pre-obese and 27.2% as obese. Furthermore, 35.1% of the adults had hypercholesterolemia, 32.7% were hypertensive and 15.2% were diagnosed with diabetes.^[11] Accordingly, the alarming upsurge of chronic diseases and obesity rates resulted in the implementation of various interventions through Ministry of Health, Malaysia. Among such interventions, a National Plan of Action for Nutrition of Malaysia was developed to confront the issues of obesity in Malaysia.^[12] Additionally, Malaysian Dietary Guidelines were introduced in 2010 promoting the rational of health eating in Malaysia.^[13] The guidelines came up with 14 key messages including the example of one-day menu for 1500 kcal (for diabetic patient, sedentary women and older adults), 2000 kcal (for children, teenage girls, moderately active women and sedentary men) and 2500 kcal (for teenage boys, active men, very active women and underweight men/women).^[13]

Although a growing concern towards the importance of healthy eating among Malaysian population is observed, the apprehension is not habitually translated into practice. Despite the proliferation of healthy eating campaigns, achieving the desired 'healthy' behaviour among the Malaysian population is not eminent.^[1] Multiple factors pose obstacles to the promotion of healthy diets, however, a thought in societies prevail that healthy food is more expensive than less healthy options. Hence, it is hypothesized that cost incurred for healthy eating is a major barrier towards healthy eating practices in Malaysia.^[8] Therefore, to address the issue of affordability of healthy eating, the current study was undertaken. The study aimed to calculate the direct cost of healthy eating options provided by the Malaysian Dietary Guidelines.

METHODS

Study design and settings

In order to minimize the effect of price fluctuations over time, the study was designed as a once-only, time-

based walk-in survey. Three hypermarkets located in the centre of the Penang city were targeted for data collection. Population's favorable choice of shopping, ease of vicinity and availability of lower price option were kept in mind while selecting the study settings.

Study variables

The examples provided by the Malaysian Dietary Guidelines for a one-day menu for 1500, 2000 and 2500 kcal were used for cost calculation.^[13] The items in the one-day menu require some preparation; therefore, it was assumed that those purchasing the food items have basic cooking skills and a location to cook and store food. In addition, the cost of travelling to the hypermarkets was not included in the calculations and only direct cost of the healthy food was procured.

Data collection and analysis

Fifteen undergraduate students enrolled at School of Pharmaceutical Sciences, Universiti Sains Malaysia were trained for data collection. The undergraduates were divided into three groups visit the hypermarkets for data collection. Worksheets were used for data collection and the data was later transferred to SPSS v 18 for analysis. Based on the objectives of the study, the data was described descriptively and average spending for a month was calculated.

Ethical consideration

The departmental research review committee of Discipline of Social and Administrative Pharmacy, School of Pharmaceutical Sciences, Universiti Sains Malaysia approved the study.

RESULTS

The example of one-day menu is presented in Figure 1. Because of nature of items presented in the menu and the bulk availability at the hypermarkets, standard unit conversion method was used to calculate the price of required amount stated in the guidelines. The following parameters were recorded after obtaining the price and unit conversion.

1. The total price per meal for each category (kcal) in one day,
2. The daily summation of healthy eating per category (kcal),
3. The average price per meal among three supermarkets in one day,
4. The cost of healthy eating per week for each category

	1500 kcal	2000 kcal	2500 kcal
BREAKFAST	Fried rice (1 cup) cooked with carrot (¼ cup) and french beans (¼ cup) Coffee (1 cup) with low fat milk (¼ cup)	Fried rice (1½ cups) cooked with carrot (¼ cup) and french beans (¼ cup) + soya bean curd (½ pieces) + chicken (½ drumstick) Coffee (1 cup) with low fat milk (¼ cup)	Fried rice (1½ cups) cooked with carrot (¼ cup) and french beans (¼ cup) + soya bean curd (½ piece) + chicken (½ drumstick) + fried egg (1 whole) Coffee (1 cup) with low fat milk (¼ cup)
MORNING TEA	Tea without sugar (1 cup)	<i>Apam kukus</i> (4 small round) Tea (1 cup) with low fat milk (¼ cup)	Doughnut (1 piece) <i>Pisang emas</i> (2 whole) Tea (1 cup) with low fat milk (¼ cup)
LUNCH	<i>Bihun sup</i> (1 cup) cooked with small prawn (10 pieces) + <i>sawi</i> + tomato + carrot + baby corn (1 cup) Watermelon (1 slice) Ice lemon tea (with 1 teaspoon sugar) (1 glass)	<i>Bihun sup</i> (1½ cup) cooked with small prawn (10 pieces) + <i>sawi</i> + tomato + carrot + baby corn (1 cup) Papaya (1 slice) Ice lemon tea (with 1 teaspoon sugar) (1 glass)	<i>Bihun sup</i> (1½ cup) cooked with small prawn (10 pieces) + <i>sawi</i> + tomato + carrot + baby corn (1 cup) Mango (1 whole small) Ice lemon tea (with 1 teaspoon sugar) (1 glass) Ice cream cup (1 small)
AFTERNOON TEA	<i>Popia basah</i> (2 pieces) Tea without sugar (1 cup) with low fat milk (¼ cup)	<i>Popia basah</i> (3 pieces) Low fat chocolate drink (1 glass)	<i>Rojak pasembor</i> (1½ cup) consists of soyabean curd + bean sprout + potato + cucumber + turnip + <i>kuah kacang</i> (¼ cup) Low fat chocolate drink (1 glass)
DINNER	White rice (1 cup) <i>Sup sayur campur</i> (½ cup) <i>Ikan kembung bakar berlada</i> (1 medium) <i>Pisang emas</i> (2 whole) Plain water (1 glass)	White rice (1½ cup) <i>Sayur campur</i> (½ cup) <i>Ikan kembung goreng berlada</i> (1 medium) Red apple (1 whole) Plain water (1 glass)	White rice (2 cups) <i>Sayur campur</i> (½ cup) <i>Ikan kembung goreng berlada</i> (1 medium) Guava (½ whole) Plain water (1 glass)

Figure 1: Example of a one-day menu (Malaysian Dietary Gui delines, 2010).

(kcal) and

- The cost of healthy eating per month for each category (kcal)

Table 1, 2 and 3 presents the comparative prices of healthy food at the three targeted hypermarkets. For the 1500 kcal menu, cost per day varied from Malaysian Ringgit (RM) 27.22 to 29.37. Cost per day for the 2000 kcal menu ranged from RM 33.70 to 37.20. Lastly, for the 2500 kcal menu, cost per day ranged from RM 45.10 to 52.77.

The average monthly cost of healthy eating in Penang, Malaysia is presented in Table 4. On average, an individual following a 1500 kcal menu needed RM 845.50 each month in order to stay healthy. Furthermore, those following 2000 and 2500 kcal menu plan had to spend RM 1062.30 and RM 1437.60 to consume healthy diet respectively.

DISCUSSION

Access to nutritious food is a basic human right. A healthy diet has four distinct characteristics; adequate, balanced, moderate and varied that provide a proper combination of energy and nutrients.^[13] However, dietary practices around the globe are reported to be irregular and unbalanced.^[14-16]

This is because that the decision of adapting to a healthy diet is not simply a matter of individual choice. Socio-economic factors, availability, and affordability, environmental and working conditions impinge on a person's ability to make healthy food choices.^[17] Within this context, affordability is often rated as a major barrier towards healthy eating. A recently conducted meta-analysis revealed that on average, healthier food-based diet patterns are more expensive than less healthy patterns with a price difference of about \$1.50/day.^[8] Moreover, yet again, studies of the same nature reported price as a major barrier towards healthy eating around the globe.^[18-21]

Inline to what was hypothesised earlier, affordability shaped as a major barrier towards healthy eating in the state of Penang, Malaysia. Our assumption is supported by comparative statistics of the current study with the state of households in Malaysia.^[22] Although the economic transformation of Malaysia during the past two decades is worth mentioning, high Gross Domestic Product (GDP) per person is never an indicator of high household income. Essentially, such high average income is deformed by the proceeds of the affluent classes and hence disguises the fact that median income is actually much lower.^[22] Nevertheless, with a median household income of RM 3626 in Malaysia,

Table 1: Cost of one-day menu for 1500, 2000 and 2500 kcal (Hypermarket A)				
Meal Type	Items	Price in Malaysian Ringgit (RM)*		
		1500 kcal	2000 kcal	2500 kcal
Breakfast	Fried rice	1 cup = 1.30	1.1/2 cup = 1.95	1.1/2 cup = 1.95
	Carrots	1/4 cup = 0.03	1/4 cup = 0.03	1/4 cup = 0.03
	French beans	1/4 cup = 0.24	1/4 cup = 0.24	1/4 cup = 0.24
	Coffee	1 cup = 0.35	1 cup = 0.35	1 cup = 0.35
	Low fat milk	1/4 cup = 0.42	1/4 cup = 0.42	1/4 cup = 0.42
	Soya bean curd	-	1/2 piece = 0.23	1/2 piece = 0.23
	Chicken	-	1/2 piece = 2.83	1/2 piece = 2.83
	Fried egg	-	-	1 = 0.80
Net cost		RM = 2.34	RM = 6.05	RM = 6.85
Brunch	Tea w/o sugar	1 cup= 0.35	-	-
	Apam kukus	-	4 pc = 2.00	-
	Tea with Low fat milk	-	1 cup = 0.97	1 cup = 0.97
	Doughnut	-	-	1 pc = 0.38
	Pisangemas	-	-	2 whole = 2.29
Net cost		RM = 0.35	RM = 2.97	RM = 3.64
Lunch	Bihun sup	1 cup= 2.00	1.1/2 cup= 3.00	1.1/2 cup= 3.00
	Small prawn	10 pc= 4.90	10 pc = 4.90	10 pc = 4.90
	Sawi + tomato + carrot + baby corn	1 serving = 1.56	1 serving = 1.56	1 serving = 1.56
	Watermelon	1 slice= 1.49	-	-
	Ice lemon tea with 1 tbsp sugar	1 glass= 0.73	1 glass= 0.73	1 glass= 0.73
	Ice cream cup	-	-	1 small= 2.00
	Mango	-	-	1 whole= 5.99
	Papaya	-	1 slice = 1.89	-
Net cost		RM = 10.68	RM = 12.08	RM = 18.18
Tea Time	Popiabasah	2 pieces = 1.00	3 pc = 1.50	-
	Low fat chocolate drink	-	1 glass = 2.07	1 glass = 2.07
	Tea w/o sugar + low fat milk	1 cup = 0.77	-	-
	Rojakpasembur	-	-	1.1/2 cup = 7.00
Net cost		RM = 1.77	RM = 3.57	RM = 9.07
Dinner	White rice	1 cup= 1.00	1.1/2 cup= 1.50	2 cups= 2.00
	Sup sayurcampur	1/2 cup= 4.30	1/2 cup= 4.30	1/2 cup= 4.30
	Pisangemas	2 whole= 2.29	-	-
	Ikankembungbakarberlada	1 medium = 5.00	1 medium = 5.00	1 medium = 5.00
	Plain water	1 glass = 0.24	1 glass = 0.24	1 glass = 0.24
	Red apple	-	1 pc = 1.49	-
	Guava	-	-	1/2 whole= 3.49
Net cost		RM = 12.83	RM = 12.53	RM = 15.03
TOTAL COST PER DAY		RM = 27.97	RM = 37.20	RM = 52.77

*1 RM = 0.24 US\$

it is noteworthy to remember that 23% of households earn less than RM 2,000 per month. Furthermore, 55% of the Malaysian population earn less than RM 4,000 per month.^[22] At the personage level, the median monthly salaries and wages in Malaysia were RM 1700.^[23] Therefore, for individuals following the 2000 and 2500 kcal plan,^[13] the calculated healthy diet corresponds to a minimum of 62.50 and 84.50% of the median salary respectively. Additionally, households in Malaysia have to make loan installment payments, which are approximately 18% of their income with the current interest rate.^[22] Consequently, to compensate the population' financial issues, Malaysian

government spent a huge amount on subsidies in previous years but such incentives were actually enjoyed by the high income group.^[22] Lastly, it is to be noticed that the prices for the current study were taken from hypermarkets where the offered prices are much lower than ordinary grocery stores.^[24] Hence, with a low-income status and high debts to be paid, healthy eating plans for at least half of the Malaysian population are not actually practicable.

From the Malaysian perspective, this study is the first to use actual prices to examine the affordability of healthy diet in the country. Our results are in line with the general trend

Table 2: Cost of one-day menu for 1500, 2000 and 2500 kcal (Hypermarket B)

Meal Type	Items	Price in Malaysian Ringgit (RM)*		
		1500 kcal	2000 kcal	2500 kcal
Breakfast	Fried rice	1 cup = 1.26	1.1/2 cup = 1.88	1.1/2 cup = 1.88
	Carrots	1/4 cup = 0.03	1/4 cup = 0.03	1/4 cup = 0.03
	French beans	1/4 cup = 0.30	1/4 cup = 0.30	1/4 cup = 0.30
	Coffee	1 cup = 1.20	1 cup = 1.20	1 cup = 1.20
	Low fat milk	1/4 cup = 0.46	1/4 cup = 0.46	1/4 cup = 0.46
	Soya bean curd	-	1/2 piece = 0.23	1/2 piece = 0.23
	Chicken	-	1/2 piece = 0.50	1/2 piece = 0.50
	Fried egg	-	-	1 = 0.70
Net cost		RM = 3.25	RM = 4.50	RM = 5.30
Brunch	Tea w/o sugar	1 cup = 1.20	-	-
	Apam kukus	-	4 pc = 2.00	-
	Tea with low fat milk	-	1 cup = 1.66	1 cup = 1.66
	Doughnut	-	-	1 pc = 1.49
	Pisangemas	-	-	2 whole = 2.00
Net cost		RM = 1.20	RM = 3.66	RM = 5.15
Lunch	Bihun sup	1 cup = 2.20	1.1/2 cup = 3.30	1.1/2 cup = 3.30
	Small prawn	10 pc = 4.90	10 pc = 4.90	10 pc = 4.90
	Sawi + tomato + carrot + baby corn	1 serving = 0.86	1 serving = 0.86	1 serving = 0.86
	Watermelon	1 slice = 1.00	-	-
	Ice lemon tea with 1 tbsp sugar	1 glass = 1.40	1 glass = 1.40	1 glass = 1.40
	Ice cream cup	-	-	1 small = 1.20
	Mango	-	-	1 whole = 3.50
	Papaya	-	1 slice = 1.00	-
Net cost		RM = 10.36	RM = 11.46	RM = 15.16
Tea Time	Popiabasah	2 pieces = 1.00	3 pc = 1.50	-
	Low fat chocolate drink	-	1 glass = 1.44	1 glass = 1.44
	Tea w/o sugar + low fat milk	1 cup = 1.66	-	-
	Rojakpasembur	-	-	1.1/2 cup = 7.00
Net cost		RM = 2.66	RM = 2.94	RM = 8.44
Dinner	White rice	1 cup = 0.57	1.1/2 cup = 0.85	2 cups = 1.14
	Sup sayurcampur	1/2 cup = 2.00	1/2 cup = 2.00	1/2 cup = 2.00
	Pisangemas	2 whole = 2.00	-	-
	Ikankembungbakarberlada	1 medium = 7.00	1 medium = 7.00	1 medium = 7.00
	Plain water	1 glass = 0.30	1 glass = 0.30	1 glass = 0.30
	Red apple	-	1 pc = 0.99	-
	Guava	-	-	1/2 whole = 1.40
Net cost		RM = 11.87	RM = 11.14	RM = 11.84
TOTAL COST PER DAY		RM = 29.37	RM = 33.70	RM = 45.89

*1 RM = 0.24 US\$

where healthy foods had increased prices than foods that were less healthy.^[25,26] In the coming future, it is unlikely that cost of healthy meal plans will reduce and affordability will be of no concern especially for those living in poverty. Hence, efforts are required to increase the perceived value of healthy eating among the Malaysian population. One possible option is to introduce a healthy-food inducement program for the population; a program that encourages people to purchase healthy foods items by providing them with a rebate for purchasing those items. The enticement program shall offer a rebate based on total spending in one month on healthy food items as mentioned in the Malaysian

Dietary Guidelines.^[13] The rebate amount will be added to the respective purchase cards of the buyers and to be used for the following month. In a very manner, items of the healthy menu plan can be ranked based on the purchasing pattern. For example, fresh vegetables and fruits would have a higher rebate ranking as compared to another foodstuff. Additionally, the rebate amounts should be significant enough to incentivize the people in purchasing healthy food and to quit junk or non-healthy options available in the markets. Due to time and financial constraints, data were reported from three hypermarkets and grocery stores were excluded from the study. Furthermore, the analysis was

Table 3: Cost of one-day menu for 1500, 2000 and 2500 kcal (Hypermarket C)

Meal Type	Items	Price in Malaysian Ringgit (RM)*		
		1500 kcal	2000 kcal	2500 kcal
Breakfast	Fried rice	1 cup = 0.50	1.1/2 cup = 0.75	1.1/2 cup = 0.75
	Carrots	1/4 cup = 0.02	1/4 cup = 0.02	1/4 cup = 0.02
	French beans	1/4 cup = 0.24	1/4 cup = 0.24	1/4 cup = 0.24
	Coffee	1 cup = 0.47	1 cup = 0.47	1 cup = 0.47
	Low fat milk	1/4 cup = 0.39	1/4 cup = 0.39	1/4 cup = 0.39
	Soya bean curd	-	1/2 piece = 0.50	1/2 piece = 0.50
	Chicken	-	1/2 piece = 1.31	1/2 piece = 1.31
Fried egg	-	-	1 = 1.00	
Net cost		RM = 1.62	RM = 3.68	RM = 4.68
Brunch	Tea w/o sugar	1 cup = 0.50	-	-
	Apam kukus	-	4 pc = 2.00	-
	Tea with Low fat milk	-	1 cup = 1.20	1 cup = 1.20
	Doughnut	-	-	1 pc = 1.80
	Pisangemas	-	-	2 whole = 1.23
Net cost		RM = 0.50	RM = 3.20	RM = 4.23
Lunch	Bihun sup	1 cup = 2.20	1.1/2 cup = 3.30	1.1/2 cup = 3.30
	Small prawn	10 pc = 1.56	10 pc = 1.56	10 pc = 1.56
	Sawi + tomato + carrot + baby corn	1 serving = 1.44	1 serving = 1.44	1 serving = 1.44
	Watermelon	1 slice = 0.08	-	-
	Ice lemon tea with 1 tbsp sugar	1 glass = 1.00	1 glass = 1.00	1 glass = 1.00
	Ice cream cup	-	-	1 small = 1.00
	Mango	-	-	1 whole = 2.00
	Papaya	-	1 slice = 0.20	-
Net cost		RM = 6.28	RM = 7.50	RM = 10.30
Tea Time	Popiabasah	2 pieces = 1.00	3 pc = 1.50	-
	Low fat chocolate drink	-	1 glass = 1.20	1 glass = 1.20
	Tea w/o sugar + low fat milk	1 cup = 0.80	-	-
	Rojakpasembur	-	-	1.1/2 cup = 7.00
Net cost		RM = 1.80	RM = 2.70	RM = 8.20
Dinner	White rice	1 cup = 0.50	1.1/2 cup = 0.75	2 cups = 1.00
	Sup sayurcampur	1/2 cup = 2.00	1/2 cup = 2.00	1/2 cup = 2.00
	Pisangemas	2 whole = 1.23	-	-
	Ikankembungbakarberlada	1 medium = 12.99	1 medium = 12.99	1 medium = 12.99
	Plain water	1 glass = 0.30	1 glass = 0.30	1 glass = 0.30
	Red apple	-	1 pc = 2.19	-
	Guava	-	-	1/2 whole = 1.40
Net cost		RM = 17.02	RM = 18.23	RM = 17.69
TOTAL COST PER DAY		RM = 27.22	RM = 35.31	RM = 45.10

*1 RM = 0.24 US\$

Table 4: Average monthly cost of healthy eating in Penang, Malaysia

Meal	1500 kcal			2000 kcal			2500 kcal		
	Average Cost	Average Cost	Average Cost	Average Cost	Average Cost	Average Cost	Average Cost	Average Cost	Average Cost
	1 day*	1 week*	1 month*	1 day*	1 week*	1 month*	1 day*	1 week*	1 month*
Breakfast	2.40	16.80	72.00	4.74	33.20	142.20	5.61	39.27	168.30
Brunch	0.68	4.76	20.40	3.28	22.96	98.40	4.34	30.38	130.20
Lunch	9.11	63.77	273.30	10.35	72.45	310.50	14.55	101.85	436.50
Teatime	2.08	14.56	62.40	3.07	21.49	92.10	8.57	59.99	257.10
Dinner	13.91	97.37	417.30	13.97	97.79	419.10	14.85	103.95	445.50
Total Average Cost	28.18	197.26	845.40	35.41	247.89	1062.30	47.92	335.44	1437.60
Average monthly spending on healthy eating	RM 845.50			RM 1062.30			RM 1437.60		

*Price in Malaysian Ringgit (1 RM = 0.23 US\$)

descriptive in nature. Future research in this area should seek to go beyond expressive analysis of the price trends and health food consumption issues in Malaysia.

CONCLUSION

This study reported the actual tangible cost attached to a healthy diet in Malaysia. The current pricing exercise reported that healthy eating is challenging for households having low and middle income. The findings are of particular importance because the immediate and long-term consequences of unhealthy diet are comprehensive and can influence lifelong practices. However, because of the involvedness of this issue, it can only be improved through the shared commitment and efforts of all stakeholders involved in food security. A security that is vital to maintain a strong and healthy population, economy, and country.

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CONFLICT OF INTEREST

None

ABBREVIATION USED

None

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