ORIGINAL ARTICLE

Nutritional Profile of Commercial Infant and Toddler Food Products Available in Klang Valley

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Abstract:

Many mothers provided commercial baby food products to their children, but studies showed that most of these products contained high sugar and sodium content. This had been overlooked by researchers, especially in Malaysia since not many studies were conducted in this area. The aims of this study were to assess the types of commercial infant and toddler food products available in Klang Valley, then compare selected nutrients content between categories and age groups. Samples of products were collected from different types of shops available in 9 areas in Klang Valley. Information was obtained from product's packaging or manufacturer's websites. Result showed that there were four types of products which were cereal, cookies or snack, simple pureed food and mixed food. There were significant differences ($p<0.005$) for calorie, carbohydrate, protein, total fat, sugar, sodium, saturated fat and fiber between the product categories. Then, between age groups, there was significant difference for saturated fat in cereal, as well as fat, sugar, sodium and saturated fat for cookies or snack, and calorie, carbohydrate, protein, sugar, sodium and fiber for mixed food. In conclusion, within the categories, cookies or snack had the highest sugar and sodium content and within age groups, both nutrients were the highest in stage 2 and 4. These findings lead to concerns as cookies or snack was usually given to babies as between-meal snack and early exposure to sugar and sodium, as early as in stage 2 (7 to 9 months), could lead to obesity and other diseases later in life. Thus, the government and health professionals should provide education to parents or caregivers on making healthier food product choices for their children.

Keywords: Commercial baby food, infant, nutrients content, toddler

1. INTRODUCTION

The first 1000 days of life is crucial to shape future health outcomes [1].The growth rate of children during this period is greater than any other time and require higher energy and nutrients [2]. Poor nutrition during this crucial period can contribute to a significant reduction in morbidity and mortality as well as delayed mental and motor development in children [3, 4]. Thus, mothers and caregivers play a key role in providing the best food for their children.

Commercial baby food products offer an alternative besides homemade food [5, 6]. The convenience, non-perishable and portable commercial baby food products provide better choices for caregivers [5]. Rapid urbanization has resulted in the increase of the sales of the baby food products in many developing countries [7].

Childhood obesity had reached an alarming threshold [8], [9]. Many studies have shown that nutrient intake during the first two years of life influence the development of metabolic disorder in later life [1, 10, 11].

Studies in the western countries showed that there were high levels of sodium and sugar in the infant and toddler food products [12, 13, 14]. This early exposure to salt and sugar determines the preferences of children to the same kind and taste later in life [13]. This situation is a concern as intake of high salt and sugar are the major causes of high blood pressure, cardiovascular diseases and increased risk of obesity [15].

Even though there were studies that highlighted the high content of sugar and salt in infant and toddlers food product, this issue still remains a low priority among researchers in the nutrition and health policy [12, 14]. There are many commercial infant and toddler food products in Malaysia hence it is important to know the nutrient content of all these food. Since the prevalence of childhood obesity in this country is at the rise [16], it is important to ensure that the infant and food products available in this country are low in salt and sugar.

Thus this study aims to assess the types of commercial infant and toddler food products available in Klang Valley and compare selected nutrients content between the product categories and age groups.

2. MATERIALS AND METHODS

2.1 Methods and Design

This is a cross-sectional study that use samples of commercial infant and toddler food products that were available in the selected stores, within 4 to 36 months [13], [17]. The products nutrient information were recorded based on the packaging or manufacturer's websites. Formula milk was excluded because the complementary food was defined as food other than breast milk or formula [18]. The study was divided into 4 phases that addressed all of the objectives.
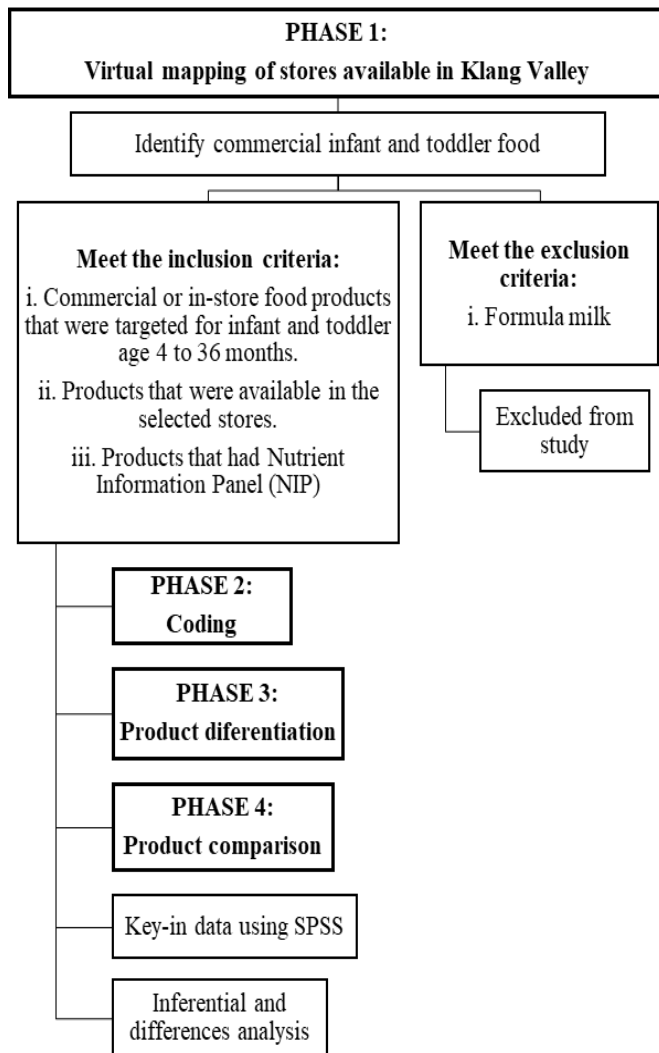

Figure 1: Flowchart of research design

Phase 1: Virtual mapping

Stores available from each type of store in each area in Klang Valley were listed. It was an internet-based survey using Google Maps. The areas in Klang Valley include Kuala Lumpur, Shah Alam, Petaling Jaya, Subang Jaya, Klang, Selayang, Ampang Jaya, Kajang and Kuala Langat [19].The stores in each of the area were categorized into three different groups which were the baby shop, supermarket and hypermarket [12], [20]. Five (5) shops were selected from each of the group to collect the sample.

Phase2: Coding process

Selected stores were visited and picture of the products that met the inclusion criteria were captured. Then extraction of the coding variables and nutrient information were taken from products' packaging, manufacturer's websites, as well as websites that provide the pictures of the products' packaging. The code's variables was developed and consisted of the name of brand and product, net weight, preparation's type, product's category, age group, and price [17]. This coding can guide the researcher to conduct the research.

Phase 3: Products differentiation

The information obtained from the previous stage were combined and distributed based on product categories and age groups using Excel. Similar products and products that did not provide the nutrient information were excluded.

Phase 4: Product comparison

Data on selected nutrients content of the commercial infant and toddler food products within product categories and age groups were compare and summarized using SPSS.

3. RESULTS

A total of 112 stores were visited and 337 different commercial infant and toddler food products were taken as samples.

3.1 Types of commercial infant and toddler food products available in Klang Valley

The types of commercial infant and toddler food products that were found were cereal, cookies or snack, simple pureed food and mixed food. The age groups were classified into stages; stage 1 (4 to 6 months), stage 2 (7 to 9 months), stage 3 (10 to 12 months) and stage 4 (12 to 36 months). Stage 1 to 3 for infant and stage 4 was for toddler. Data were presented in frequency and percentage (Table 1).

Table 1: Distribution of commercial infant and toddler food products across product categories

Age group	N (337)	Cereal (n=77)	Cookies/snack (n=126)	Simple pureed food (n=17)	Mixed food (n=117)
Stage 1	180 (53.4)	48 (62.3)	32 (25.4)	14 (82.4)	86 (73.5)
Stage 2	84 (24.9)	26 (33.8)	39 (31.0)	3 (17.6)	16 (13.7)
Stage 3	9 (2.7)	1 (1.3)	3 (2.4)	0 (0.0)	5 (4.3)
Stage 4	64 (19)	2 (2.6)	52 (41.3)	0 (0.0)	10 (8.5)

3.2 Comparison of selected nutrients content of commercial infant and toddler food products between product categories

The nutrient content was selected based on the common nutrient content that was stated on the nutrient information panel (NIP) per 100 gram of the products. Eight nutrients were chosen which were calorie (kcal), carbohydrate (g), protein (g), total fat (g), sugar (g), sodium (mg), saturated fat (g), fibre (g), as well as addition of another two nutrients, iron (mg) and calcium (mg), but only if displayed on the packaging. Four product categories were involved, which were cereal, cookies or snack, simple pureed food and mixed food.

Table 2: Comparison of selected nutrient content per 100 gram of cereal, cookies or snack, simple pureed food and mixed food

	Cereal (n=77)	Cookies / snack (n=126)	Simple pureed food (n=17)	Mixed food (n=117)	p-value*
Calorie (kcal)	355.1 ± 97.9	396.5 ± 40.5	74.6 ± 33.7	87.0 ± 88.3	0.000
Carbohydrate (g)	69.1 ± 20.0	77.6 ± 12.33	13.6 ± 2.3	15.9 ± 15.1	0.001
Protein (g)	10.0 ± 4.1	6.4 ± 5.1	1.0 ± 0.8	1.9 ± 4.1	0.000
Fat (g)	4.0 ± 3.1	5.7 ± 6.6	0.6 ± 0.8	0.8 ± 1.2	0.000
Sugar[1] (g)	3.9 ± 7.0	20.8 ± 21.8	10.2 ± 2.5	11.3 ± 12.9	0.000
Sodium[2] (mg)	114.5 ± 212.9	130.2 ± 144.7	7.3 ± 7.3	25.4 ± 58.8	0.000
Saturated fat[3] (g)	1.6 ± 1.3	1.8 ± 3.1	0.4 ± 0.4	0.2 ± 0.3	0.000
Fiber[4] (g)	4.1 ± 3.2	4.2 ± 11.0	1.3 ± 0.6	1.4 ± 0.7	0.004

*ANOVA test is significantly differenced at $p < 0.005$

[1] Only 333 products with sugar content data were accounted in this table

[2] Only 271 products with sodium content data were accounted in this table

[3] Only 264 products with saturated fat content data were accounted in this table

[4] Only 240 products with fiber content data were accounted for in this table

One-way ANOVA test was performed to see if there was any significant difference between these product categories. Data were presented as mean ± SD of nutrient per 100 gram (Table 2).

Result showed that there were significant differences ($p < 0.05$) for each of the nutrients content within the product categories. Cookies or snack had the highest amount of calorie, carbohydrate, fat, sugar, sodium, saturated fat and fiber among the product categories. However, it was lower than cereal in term of protein content. The cereal was the second of having high amount of calorie, carbohydrate, protein, fat, sodium, saturated fat, fiber and salt, although its sugar content was the lowest among other product categories. Next, simple pureed food contained the lowest amount of calorie, carbohydrate, protein, fat, sodium and fiber, however its sugar, saturated fat and salt were higher than mixed or blended food. Lastly, the mixed food had a higher amount of calorie, carbohydrate, protein, fat, sugar, sodium and fiber compared to simple pureed food, but had lower saturated fat and salt compared to the simple pureed food.

3.3 Comparison of selected nutrients content of commercial infant and toddler food products between age groups

The nutrient content were categorized according to age groups for each of the product categories, which were, stage 1 (4 to 6 months), stage 2 (7 to 9 months), stage 3 (10 to 12 months) and stage 4 (12 to 36 months). There were a total of 4 stages for cereal, cookies or snack and mixed food, but only a total of 2 stages for simple pureed food.

One-way ANOVA test was done to compare the nutrients content according to age groups. The data were presented as the mean ± SD of nutrient content per 100 gram (Table 3).

Result showed that in cereal products, there was a significance difference ($p < 0.05$) in saturated fat between age groups. The saturated fat content was the highest in stage 4 and the lowest in stage 3.

Next, in cookies or snack products, there were significant differences ($p < 0.05$) between age groups for fat, sugar, sodium and saturated fat. For fat, the highest content was in stage 3 and the lowest was in stage 1, for sugar, the highest was in stage 4 and the lowest was in stage 3. Then, for sodium, the highest was in stage 1 and the lowest was in stage 3. For saturated fat, the highest content was in stage and the lowest was in stage 1.

In simple pureed food products, only stage 1 and 2 were available in the stores. There was no significant difference ($p > 0.005$) between the age groups for each of the nutrient. Lastly, for mixed food products, there were significance differences ($p < 0.05$) between age groups for calorie, carbohydrate, protein, sugar, sodium and fiber. For calorie, the highest content was in stage 2 and the lowest was in stage 3 and for carbohydrate, the highest was in stage 2 and the lowest was in stage 3. Then, for protein, the highest was in stage 2 and the lowest in stage 4. For sugar and sodium, both sugar and sodium content were the highest in stage 2 and both were the lowest in stage 3. Lastly, for fiber, the highest was in stage 4 and the lowest was in stage 2.

4. DISCUSSION

4.1 Comparison of selected nutrients content of commercial infant and toddler food products between product categories

Cookies or snack had mostly the highest amount of nutrients content, compared to other categories, which made it as a good source of nutrients for the young children. However, the concern was it also contained the highest amount of sodium and sugar when it was 83.2% food eaten by infants before 8 months old in Taiwan [21]. Plus, previous study in US found that infant or toddler savory, snacks or sides contained the highest sodium concentration compared to other product categories and majority of toddler food products contained ≥1 added sugar as an ingredient [22].

Table 3: Comparison of selected nutrients content between per 100 gram for different age groups in cereal, cookies or snack, simple pureed food and mixed food

	n	Calorie (kcal)	Carbohydrate (g)	Protein (g)	Fat (g)	Sugar (g)	Sodium (mg)	Saturated fat (g)	Fiber (g)
Cereal									
Stage 1	48	351.1 ± 116.7	69.2 ± 23.7	8.5 ± 4.0	4.1 ± 3.3	4.4 ± 7.2	111.9 ± 242.5	1.7 ± 1.6	3.6 ± 3.0
Stage 2	26	359.8 ± 57.0	68.9 ± 12.7	12.5 ± 2.8	3.8 ± 2.8	2.9 ± 6.9	119.6 ± 143.3	1.4 ± 1.0	4.9 ± 3.7
Stage 3	1	367.0 ± 0.0	65.6 ± 0.0	11.3 ± 0.0	4.7 ± 0.0	13.6 ± 0.0	0.0 ± 0.0	1.0 ± 0.0	8.3 ± 0.0
Stage 4	2	384.0 ± 33.9	68.9 ± 5.5	13.8 ± 1.8	5.1 ± 5.6	1.0 ± 1.4	175.5 ± 246.8	2.3 ± 1.8	3.7 ± 0.4
p-value		0.046	0.082	0.177	0.144	0.340[1]	0.819[2]	0.004*[3]	0.230[4]
Cookies/ snack									
Stage 1	32	390.5 ± 38.1	85.9 ± 9.8	7.2 ± 5.7	2.0 ± 3.2	13.3 ± 14.7	258.5 ± 147.8	0.3 ± 0.9	1.7 ± 2.3
Stage 2	39	391.5 ± 36.4	78.2 ± 13.2	4.7 ± 4.7	4.5 ± 6.6	16.5 ± 16.1	40.9 ± 63.3	0.9 ± 1.8	1.7 ± 2.9
Stage 3	3	399.7 ± 21.4	68.9 ± 7.8	6.9 ± 0.3	9.3 ± 6.0	9.3 ± 8.1	17.7 ± 12.9	1.4 ± 0.1	0.1 ± 0.0
Stage 4	52	403.7 ± 45.3	72.6 ± 10.4	7.2 ± 4.9	8.8 ± 6.9	29.2 ± 26.7	143.0 ± 140.3	3.4 ± 4.1	7.2 ± 15.7
p-value		0.350	0.926	0.063	0.000*	0.000*	0.000*[5]	0.000*[6]	0.228[7]
Simple pureed food									
Stage 1	14	75.7 ± 37.2	13.8 ± 2.3	1.0 ± 0.9	0.5 ± 0.8	10.9 ± 2.1	6.3 ± 6.9	0.3 ± 0.5	1.4 ± 0.6
Stage 2	3	69.3 ± 8.1	12.6 ± 2.4	1.1 ± 0.4	0.9 ± 0.2	6.9 ± 1.0	16.0 ± 0.0	0.5 ± 0.2	1.0 ± 0.1
p-value		0.228	0.955	0.274	0.097	0.157	-[8]	0.053[9]	0.090[10]
Mixed food									
Stage 1	86	65.3 ± 19.3	12.4 ± 3.5	1.0 ± 0.8	0.7 ± 1.0	8.8 ± 4.0	9.0 ± 7.8	0.1 ± 0.3	1.6 ± 0.5
Stage 2	16	224.9 ± 185.3	38.5 ± 32.2	7.3 ± 9.5	1.1 ± 1.8	29.3 ± 27.5	116.1 ± 112.7	0.1 ± 0.2	0.4 ± 0.7
Stage 3	5	63.0 ± 18.0	7.0 ± 1.7	3.2 ± 1.3	2.1 ± 1.4	2.5 ± 1.1	0.0 ± 0.0	0.6 ± 0.7	1.5 ± 0.3
Stage 4	10	65.7 ± 21.9	13.9 ± 4.0	0.6 ± 0.4	0.7 ± 0.7	8.5 ± 3.9	4.6 ± 4.9	0.1 ± 0.3	1.7 ± 1.0
p-value		0.000*	0.000*	0.000*	0.037	0.000*[11]	0.000*[12]	0.012[13]	0.000*[14]

* ANOVA is significantly differenced at p<0.005

[1] *Only 74 products with sugar content data were accounted in this table*
[2] *Only 72 products with sodium content data were accounted in this table*
[3] *Only 52 products with saturated fat content data were accounted in this table*
[4] *Only 69 products with fiber content data were accounted for in this table*
[5] *Only 107 products with sodium content data were accounted in this table*
[6] *Only 112 products with saturated fat content data were accounted in this table*
[7] *Only 87 products with fiber content data were accounted for in this table*
[8] *Only 9 products with sodium content data were accounted in this table*
[9] *Only 14 products with saturated fat content data were accounted in this table*
[10] *Only 11 products with fiber content data were accounted for in this table*
[11] *Only 116 products with sugar content data were accounted in this table*
[12] *Only 83 products with sodium content data were accounted in this table*
[13] *Only 86 products with saturated fat content data were accounted in this table*
[14] *Only 73 products with fibre content data were accounted in this table*

Another study also found that toddler entree and dinner products had high levels of sodium [12]. There were limited study in eating trend of commercial infant and toddler food products recently in Malaysia, but these recent findings showed that cookies or snack products were mostly high in sodium and sugar [12], [22] . It is recommended for children even adult to take less than 10% of sugar from the daily calorie [23] and also further reduction until 5% of sugar [24]. Thus, parents or caregivers should pay careful attention as cookies or snack was the kind of food that was usually given to infant and toddler in between meal and also to keep them calm [17].

4.2 Comparison of selected nutrients content of commercial infant and toddler food products between age groups

In term of sugar and sodium content, only cookies or snack and mixed food products showed significant differences (p<0.05) within the age groups. Cookies or snack had the highest sugar content in stage 4 and the highest sodium content in stage 2. Meanwhile, for mixed food the highest sugar and sodium content were in stage 2. This early exposure, as early as in stage 2 (7 to 9 months), could highly increase the preference of the children to the same kind and taste later in life [25]. Plus, the consumption of snack usually increased with the age [26], in which the intake could be more in stage 4 where it was found to be high in sugar content. Early consumption of these two nutrients could lead to obesity and type-2-diabetes [12], 2011), as well as high blood pressure among children and other fatal diseases like stroke and coronary heart disease in the future [25].

5. CONCLUSION

This study found that most of the selected nutrients content of commercial infant and toddler food products showed significance differences (p<0.005) between categories and age groups. Within product categories, cookies or snack had mostly the highest nutrients content compared to others, including the sodium and sugar content. Meanwhile within age groups, sodium and sugar content were the highest in stage 2 and 4. These findings lead to several concern as cookies or snack was usually given to babies to keep them preoccupied and calm their emotion. Plus, early exposure to sodium and sugar could lead to obesity, high blood pressure among children and other fatal diseases later in life.

Thus, parents and caregiver should be well informed about the nutrients content of the types of food given to their children. The government and the health professionals should provide health programs to educate parents or caregivers on making healthier food choices for their children by comparing the nutrients content between

products through the nutrition information panel (NIP), especially on the sugar and sodium content. This study can also be used as a platform for future study in Malaysia, regarding the nutrients content in commercial infant and toddler food products.

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