３．ベトナム・カンボジアの糖類成分表

ベトナムとカンボジアの菓子類と飲料類の糖類成分表

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主な出典） Shikanai S, Hien VTT, Tuyen LD, Hop LT, Nhung BT, Thuan NT, Suzuki E, Yamamoto S. Concentration of glucose, fructose, sucrose, lactose and maltose in Vietnamese snacks/beverages.　Vietnam Journal of Food and Nutrition Science 9. 75-79 . 2014

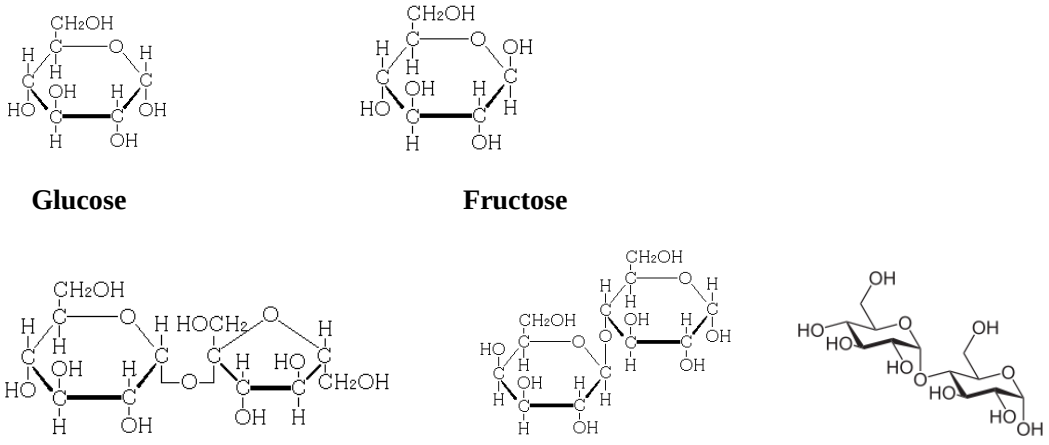
糖類は、美味しいために摂取量が多くなりやすい。糖類の過剰摂取は、肥満、糖尿病などの疾患の原因となることが多数報告されている。近年、世界的に異性化糖の生産・流通は増加しており、この傾向は日本国内でもみられる。その一因として異性化糖は、デンプンから生産されるため供給が安定的で低価格であるためである。なお、異性化糖は液状で販売されるために、主に飲料に使用されている。この異性化糖を子どもたちが過剰に摂取することに起因する疾病、特に肥満との関係が、近年米国で注目されている。　東南アジア地域では経済発展にともない生活水準が向上し、以前より糖類の摂取の機会が増加している。アジアにおいても肥満率は急激に増加しており、その割合は、マレーシアで **40%**以上、タイ、シンガポール、フィリピンでは約 **30%**である。

本研究を行ったベトナムとカンボジアは隣国である。両国は、食生活や流通する食品が非常によく似ているほか、食文化や生活習慣が似かよっているため、本研究では、ベトナムとカンボジアを同じ地域として扱うこととした（ベトナム・カンボジア)。ベトナム・カンボジアでも飲料等の消費増加が観察される。しかし、食品中のスクロース、グルコース、フルクトース、ラクトースおよび マルトースなどの単糖・**2** 糖類の含量を示した糖類成分表がないため、糖類摂取量を算定することができない。

ベトナムとカンボジアで初めてとなる菓子類・飲料類中の糖類成分表を作成した。試料は、両国でよく摂取されている菓子・飲料 **46** 種類（各種類につき製造業者のことなる３商品以上）を選び、糖類を測定した。ベトナムとカンボジアの食品の類似性から、成分表にはベトナムとカンボジア両国で販売されている菓子・飲料を掲載した。ただし、生鮮果物、無加糖牛乳は対象外とした。

2.1.3. Characteristics of sugar

Each sugar has different characteristics. Their chemical structures are shown in Fig. 2.4-1.



Glucose **Fructose**

Sucrose **Lactose** **Maltose**

Fig. 2.4-1. Chemical structures of glucose, fructose, sucrose, lactose and maltose

Brief characteristics of representative sugars and sweeteners are explained below.

Mono-saccharide:

Glucose: Glucose is a mono-saccharide that is often called grape sugar. Cells use it as the primary source of energy. Carbohydrates from meals/food are absorbed in the small intestine, except for fiber, which is not absorbed, and used as energy, especially for the brain.

Fructose: Fructose is a mono-saccharide found in many fruits and plants. It is widely used in commercial foods and beverages mainly because of its high relative sweetness. The taste of fructose is favored because the sensation reaches a peak and diminishes more quickly than that of sucrose.

Isomerized sugar: Isomerized sugar, often called High Fructose Corn Syrup (HFCS) in the U.S., is a mixture of glucose and fructose. HFCS is produced from corn starch (which yields corn syrup), which is almost entirely glucose, and then by the addition of enzymes some of the glucose is changed into fructose. The syrup contains approximately 42% fructose. Some of the 42% fructose is purified to 55% and to 90% fructose. The ratio of fructose is categorized and regulated by the Japanese Agricultural Standard (JAS) in Japan. The enzyme process that changes the corn starch into HFCS 42 is first, the addition of alpha-amylase to produce shorter chains of sugars from raw cornstarch. Then the addition of an enzyme called glucoamylase breaks down the shorter chains of sugars to yield the simple sugar glucose. Finally, xylose isomerase converts glucose to a mixture of about 42% fructose. This 42–43% fructose glucose mixture is subjected to a liquid

chromatography step, where the fructose is enriched to about 90%. The 90% fructose is then back-blended with 42% fructose to achieve a 55% fructose final product.

The sweetness of glucose is about 74 % of sucrose but that of fructose is 173 %. Therefore the mixture of glucose and fructose is sweeter than sucrose at low temperatures and produces a desired sweetness. In addition, it is in liquid form and is cheaper than sucrose. For these reasons, isomerized sugar is commonly used as a sweetener to replace sugar in beverages, ice cream and other food products.

Di-saccharide: A di-saccharide is the carbohydrate formed when two mono-saccharides undergo a condensation reaction which involves the elimination of a small molecule, such as water, from the functional groups. Three common examples are sucrose, lactose, and maltose.

Sucrose: Sucrose is the most widely used di-saccharide, especially in the home. It is found predominately in sugarcane, sugar beets, palm and sugar maple. It is a combination of glucose and fructose and is broken down by acidic hydrolysis into the mono-saccharides.

Lactose: Lactose is a di-saccharide that is found most notably in milk and is formed from galactose and glucose. Lactose makes up around 4.5% of milk.

Maltose: Maltose is a di-saccharide consisting of two glucose molecules joined. It is less sweet than sucrose (about 30%) and is less used at present. It is used frequently in the beer-brewing process but little used as a sweetener in snacks, ice cream, beverages and other food products.

2.1.4. Types of sugar and health

Most of the sugars in beverages are isomerized sugars (glucose and fructose made from starch) rich in fructose, which are used world-wide. Recent reports show that fructose consumption in human results in increased visceral adiposity, lipid dysregulation, and decreased insulin sensitivity, all of which have been associated with increased risk for cardiovascular disease and type-2 diabetes. A proposed model for the differential effects of fructose and glucose is presented. Dose-response studies investigating the metabolic effects of prolonged consumption of fructose, by itself and in combination with glucose, on lipid metabolism and insulin sensitivity in both normal weight and overweight/obese subjects are needed (8-12). On the other hand, in reality, the rising prevalence of obesity in children, for example in the US, has been reported to be linked in part to the consumption of sugar-sweetened drinks (11). From 1994 to 1996, Americans aged 2 years and older (n=15,010) consumed the equivalent of 82 g carbohydrate per day from added sweeteners, which accounted for 16% of total energy intake (13).

2.1.5. Sugars and health in developing countries

Sugar was originally produced in the area of tropical Southeast Asia or elsewhere in tropical areas of the world. And it was then introduced to places such as Africa and Brazil with their sad history of slavery. For a long time sugar was produced by hard effort (workload) by people in those areas, and as a result, it was available only to the rich. In the areas of production, people chewed the sugar cane stalk as a snack or produced only a small amount of crude sugar domestically for cooking and producing sweets. However, in recent years, the price of sugar has declined and also the technique of producing many kinds of sweetener, such as High Fructose Corn Syrup (HFCS), in factories through chemical processes has made widely available products that can be used as sweeteners. As a result, many can have products with sweeteners, especially drinks, almost anywhere in the world. We can see soft drinks everywhere in Southeast Asian countries as well. In the cites, there are many variety of SSBs in coolers in the markets or in refrigerators in supermarkets, and in the rural areas, we can see that typical flavors of SSBs such as cola and orange soda are sold from coolers at local retail shops in villages.

In Vietnam and Cambodia, which are located in the tropics and are categorized as developing countries, sugar production is also high (14, 15). However, their own consumption of sugar was not so high for a long time (16, 17). Historically, both countries were colonized by the French and others, and because their production was mainly exported while the price of sugar was high in the global market, they consequently did not consume much in their domestic market. Recently, however, cheap sweet products (drinks and snacks) from outside the country have come in as a result of the globalization of the import/export market, and the consumption of some products might be higher than before, given the improving economic situation. We know about sugar export /import production only from FAO statistics.(14,15) There are no data about sugar intake in Vietnam and Cambodia.

2.1.6. Adverse effects of white rice, like those of sugar, on type-2 diabetes

The prevalence of type 2 diabetes mellitus (DM) has recently increased world-wide and has become a global public health problem (18). Asians are thought to be particularly susceptible to DM (19). There are more than 115 million people with diabetes in Asian countries. According to national surveys of diabetes, in Vietnam the prevalence of DM and impaired glucose tolerance (IGT) in 2003 were 2.7% and 7.7%, respectively (20), but in 2012 reached 5.7% and 12.8% (21). It is estimated that the number of Vietnamese DM cases will double by 2030 compared to 2010 (22). It is interesting that newly diagnosed Vietnamese

diabetics have a BMI of about 23 (23-25) and this is similar to that of the Japanese standard (26). The use of white rice as a staple food may be the major factor, since it has been demonstrated to be and classified as a high glycemic index (GI) food. Both sugar and white rice are considered risk factors for DM (27, 28, 31).

Vietnamese have high white rice diets. According to the National Nutrition Survey 2009-2010, approximately 70% of the energy intake was contributed by carbohydrates, mainly from white rice (29). A study (30) that was designed to elucidate the effect of a typical Vietnamese diet with a high white rice content on postprandial blood glucose levels showed that a diet high in white rice is not favorable for the control of blood glucose levels, especially for middle-aged and elderly persons.

2.2. Geography of rice production

Fig.2.2. Map of South-East Asia(32)

Vietnam is located in the center of South-East Asia, linked to the larger Asian continent and looking out on the Pacific Ocean. Vietnam is bordered by Cambodia to the West, Laos and China to the North and by the East China Sea to the East. Cambodia shares its eastern border with Vietnam and its western and northern borders with Thailand. Vietnam and Cambodia are essentially tropical countries with a humid monsoon climate, which is good for rice production. Many areas are able to produce rice 2 to 3 times a year.

2.3. Food culture in Vietnam and Cambodia

Vietnam and Cambodia have similar food cultures, especially Southern Vietnam and Cambodia. The climate creates ideal conditions for growing rice, a wide variety of fruits, vegetables, and livestock. Traditional meals usually include plain white rice, catfish in a clay pot, and sour soup with snakehead fish and it is not complete without fish sauce as a condiment. Sugar is added to food more than in the other regions. The preference for sweetness can also be seen in the widespread use of coconut milk.

White rice is consumed as the staple food. Traditionally, people eat their meals with at least three or four dishes. A large bowl/pot/cooker of steamed long-grain white rice; Individual bowls of rice; Fish/seafood, meat, tofu (grilled, boiled, steamed, stewed or stir-fried with vegetables); A stir-fry dish; Raw, pickled, steamed, or fresh vegetables; a clear broth with vegetables and often meat or seafood or some other soup. Each individual dish will have either a sweet, sour, salty or bitter taste. Chili (fresh, pickled or dried) and chili sauce are served on the side and left up to individual diners and to their taste. A typical traditional meal is shown in picture 2.3-1.

Rice is also consumed as the main ingredient for making light and heavy snacks using a great number of cooking styles and techniques. For example, in pictures 2.3-2a,b (Picture "a" is seen in Vietnam, picture "b" is seen in Cambodia), there is a roll made of raw rice paper (a flat wide noodle) with vegetables (sometimes shrimp) inside. In pictures 2.3-3a,b, there is a pan-cake made from rice powder colored with turmeric; stir-fried minced meat, vegetables (bean sprouts) and dried shrimp are put inside. When it is ready to eat, many kinds of fresh herbs are wrapped with it. When it is eaten, dried crushed peanuts are sprinkled on it, and then it is dipped in a sweet and sour sauce made from sugar and fish sauce with lime juice. These are eaten as a substantial snack. With regard to noodles made from rice, for breakfast, Kuy Teav is Cambodia's famous rice noodle (thin long noodles) soup (picture 2.3-4a,b); in Vietnam, Pho (Picture 2.3-4c) is also a famous rice noodle (flat long noodles) soup. As these examples show, there are many varieties and styles of rice noodles in both countries. Sticky rice is most often consumed as a dessert, often with slices of tropical fruit like mango or durian and coconut milk (picture2.3-5). Many snacks are eaten with a sugary sauce and sometimes with coconut milk.

Picture 2.3-1.

A typical family meal with a lot of white rice

Picture 2.3-2a.

Picture 2.3-2b.

Picture 2.3-2a and b show rice flour pan-cake Vietnamese-style called *Bánh xèo* (left) and Cambodian-style called *Banh chiao* (right).

Picture 2.3-3a.

Picture 2.3-3b.

Picture 2.3-3a and b show rice paper snack called *bánh cuốn* in Vietnam (left), called *banh kung/kat* in Cambodia (right).

Picture 2.3-4.a.

Picture 2.3-4.b.

Picture 2.3-4.c.

Picture 2.3-4.a shows *Kuy Teav* (or *Ka Tieu*) as served in a restaurant in Vietnam (left), picture2.3-4.b shows *Kuy Teav* in Cambodia (right) and picture 2.3-4.c, shows *Pho* as served in a restaurant in Vietnam (below).

Picture 2.3-5.

Picture 2.3-5 shows a sticky rice served with durian in coconut milk sauce in Cambodia.

2.4. Nutritional transition in Vietnam and Cambodia

Like the economic situation, the dietary pattern also changes under the influence of globalization. Not only in the Southeast Asian countries, but also worldwide, the influence of fast foods may be one cause of obesity and lifestyle-related diseases such as diabetes and chronic diseases. In addition, people's food choices, especially those of children, have also been changing.

Picture 2.4a.

Picture 2.4b.

Picture 2.4a and b. There are many products from neighboring countries in the market (left) and a typical retail shop sells snacks and drinks in a local market (right).

2.5. Purposes of the studies

As described above, Vietnam and Cambodia are areas good for rice production. Their meals (most of the energy and/or nutrients) depend on rice and rice products this is also the case with snacks. With a high white rice intake, the prevalence of diabetes mellitus (DM) is high even in people with relatively low BMI(20). Given such a context, the recent tendency toward also consuming Western-style cheap empty foods and beverages rich in sugars and lipids makes people more and more susceptible to DM and other metabolic diseases. Therefore a strategy to control sugar intake as well as white rice and lipids is important for the health of Vietnamese and Cambodians. In particular, children in developing countries such as Vietnam and Cambodia can easily access SSBs along with western-style fast food (such as fried potatoes, chicken and junk snacks) just as children in developed countries do; however there is as yet no research regarding the sugar intake of children in Southeast Asian countries. High sugar intake together with traditional high white rice can easily increase diabetes, obesity and other chronic diseases/ life-style related diseases. This is the reason that we decided to conduct these 2 studies. In study 1 we constructed a sugar composition table for Vietnam and Cambodia. In study 2 we conducted a survey for investigating sugar intakes for Vietnamese and Cambodian children and Japanese children. We included Japanese children because Japan is well known as the country with lowest per-capita consumption of sugary beverages (sugar) and the lowest prevalence of obesity in the world(2).

3. Study 1: Construction on a sugar composition table for Vietnam and Cambodia

3.1. Objectives

Because of the tastiness of sugars, it is easy to consume more than an adequate amount. There are many research reports indicating that excess of sugars intakes causes conditions such as dental decay, and lifestyle-related diseases such as obesity, diabetes etc.(33). Given the continuous economic development in Asian countries, it is increasingly easy for people to consume more sugars in their daily life than previously (34). Currently, isomerized sugar (a mixture of glucose and fructose) made from starches is commonly used in commercial beverages because of its low price (35). Isomerized sugar intake in US children over 2 years old is 132 kcal (the energy equivalent of about 33g of sucrose) and is a major cause of obesity (11). Obesity from high isomerized sugar intake is now a world-wide problem among both high and low socioeconomic populations (36, 37).

In particular, the consumption of sweeteners produced by the isomerization reaction, such as High Fructose Corn Syrup (HFCS), is increasing because of lower cost. For these reasons, current sugar composition tables in most Asian countries do not include the variety of sugars now available (38-42). Therefore, sugar composition tables for Japan and Vietnam have constructed (43-45).

We measured concentrations of sugars (sucrose, glucose, fructose, lactose and maltose) in 49 food items (26 commercial beverages and 7 chilled snacks, 16 commercial snacks) that are popular in shops and markets in Vietnam. We used the enzymatic method, which is simple to use and provides high-precision results that have been widely adopted in research (46). We analyzed mono-saccharides (glucose, fructose) and di-saccharides (sucrose, lactose and maltose) in 3 samples from different manufacturers of each food.

3.2. Method

46 food items which are commonly used and rich in sugar were selected and analyzed for glucose, fructose, sucrose, lactose and maltose by the enzymatic method. The 46 food items consisted of 26 drinks, 13 snacks, 1 yogurt and 6 chilled snacks that were available in markets and for each item, more than 3 products from different companies were collected and analyzed using the enzymatic method. Analyzed sugars were mono-saccharides (glucose and fructose) and di-saccharides (sucrose, lactose and maltose), and all analyzed sugars were measured.

Enzymatic analysis is easy and yields high-precision results that have been adopted widely in the research. Many organizations such as the International Organization for Standardization (ISO) and the Association of Official Analytical Chemists (AOAC) have determined standard values from enzymatic analysis as an Official Method of Analysis and recommend it (46).

3.2.1. Sample preparation

Typical sample preparation for the analysis is explained in this part.

We used clear colorless and practically neutral liquid sample directly or after dilution.

Turbid solutions : filtrate

Acid sample : adjust to pH 8 by adding sodium

Solid sample : crush or homogenize , extract with water and filter if necessary.

Sample containing fat : extract with hot water and cool to allow the fat to separate, add up to the mark, place the volumetric flask in an ice bath for 15 min.and filter; alternatively, clarify with Carrez reagents after extraction with hot water.

3.2.1-(1) Beverages

3.2.1-(1)-1. Ordinary beverages

- **Sample concentration about 0.05-0.8 g/L by distilled water.**
- **The diluted sample solution can also be used for the assay if it is colored. Only strongly colored juices which are used undiluted content are to decolorized**

3.2.1-(1)-2. Carbonated beverages

- **To remove the carbonic acid, stir approximately 5-10 mL of liquid in beaker for approximately 30 seconds with a glass rod or filter through a fluted filter paper**
- **The largely CO_2-free sample can be used undiluted for the assay.**

3.1.2-(1)-3. Lactated drinks and yogurts

- **Accurately 1g of sample in a 100 mL volumetric flask,**
- **Add 60 mL water and incubate for 15 min in 70℃ hot water.**
- **Shake from time to time .**
- **For clarification add 5mL of carrez solution 1, 2 and 10mLof NaOH.**
- **Mix after each addition.**
- **Adjust to 20-25℃ and fill up to the mark with water and filter.**

3.1.2-(2) Solid samples and samples containing oil and fat

3.1.2-(2)-1. Solid samples

- **Homogenize in a mill machine.**
- **Take homogenized sample (1g) and put into a 100 mL volumetric flask. Mix with 40-60℃ water.**

3.2.1-(2)-2. Samples containing oil and fat

- **Homogenize in a mill machine.**
- **Take homogenized sample (1g) and put into a 100 mL volumetric flask. Mix with 40-60℃ water**

・Homogenize for 3 minutes in the mill machine again.

・Put into a centrifugal tube and centrifuge by the centrifugal separator for cool.

・Leave in a refrigerator in 20 minutes until cool to allow the fat to separate and discard the top few mL.

Table 3.2 shows the contents of our samples.

Table 3.2. The number of investigated items

Food group		Investigative items
Beans	Soy beans(soymilk)	2
Milk	milk	2
	sugar added milk	5
	Fermented/lactic acid	2
	Ice cream	5
	Others	2
Snacks		
	Jelly snack	2
	Candy	3
	Sweet cake/snack	5
	Chocolate	1
	Others	2
Beverages		
	Tea	1
	Coffee/Cocoa	1
	Others	13
Total		46

3.3. Results

From the results for measurement of sugars, table 3.3-1 shows the result for beverages. Most of the juices contained almost the same ratio of glucose and fructose plus some sucrose. Some of the fruit juices contained more fructose than glucose. Soda/soft drinks; cola type drinks; fruit-flavored soda, such as orange soda, contained almost no sucrose. However, bottles or cans of black or green tea with lemon flavor contained higher glucose and fructose compared to other beverages; this is often called lemon tea and contained almost the same ratio of glucose, fructose, and sucrose. Soymilk contained mostly sucrose, in both local products (made by venders or in small local factories and sold only in local markets) and commercial products. Dairy products, both milk with sweetener added but no additional flavor (often called 'plain') and milk with flavors such as strawberry, chocolate, etc., contained mainly sucrose and lactose from the source product (milk).

Table 3.3-2 shows the results for snacks: Jelly in a cup or a packed in a tube contained mainly sucrose and some glucose and fructose; however the ratio of glucose and fructose in jelly drinks was higher than in jelly snacks (cup and tube). Almost all kinds of candies contained high amounts of sucrose. Milk-flavored candies contained little lactose. Candies also contained maltose. Candies are commonly sold by the piece in small shops around schools and are popular among children in Cambodia. Chocolate also contained high amounts of sucrose mainly, and some lactose. Gummy candy (Chewy candy) also contained mainly sucrose, maltose and some glucose and fructose. Snacks mainly contained sucrose; some snacks with creams contained little lactose. Local cake also contained sucrose mainly.

Table 3.3-4 shows the result for ice-cream. Recently, world-wide franchised ice-cream shop chains and similar types of shops (not franchised chains) have become popular in Vietnam and Cambodia, particularly in the cities. Commercial ice-cream products (packed and sold in supermarkets or local retail shops in towns, sometimes in small shops in schools) are also commonly eaten. On the other hand, local mobile vender ice-cream shops are also popular in many areas in Vietnam/Cambodia, particularly around schools. All products contained sucrose mainly. They contained little glucose or fructose, and local vender-made ice-cream had almost no fructose or glucose. Local vender-made ice-cream contained less lactose than the two other commercial products (shop-made or factory-packed). All the results are shown in Table 3.3.

Table 3.3. Monosaccharide and Disaccharides in commercial beverages, snacks in Vietnam and Cambodia in enzymatic analysis

3.3-1 < Beverages >

No.	Food	Glucose	Fructose	Sucrose	Lactose	Maltose	Total (g/100g)
1.	Lemon tea	3.76±1.48	3.71±1.37	3.20±2.64	-	-	10.67
2.	Orange soda	6.26±1.00	7.16±0.21	0.07±0.20	-	-	13.49
3.	Orange juice 10%	3.86±0.71	4.72±1.55	4.41±2.96	-	-	12.99
4.	Orange-flavored juice	3.45±0.10	3.50±0.09	0.76±0.02	-	-	7.71
5.	Orange Juice with pulp	3.52±0.83	3.50±0.82	6.78±3.38	-	-	13.80
6.	Apple juice	3.44±1.56	5.08±2.95	2.78±4.24	-	-	11.29
7.	Pineapple juice	4.04±0.75	4.28±0.97	1.96±1.08	-	-	8.10
8.	Rambutan juice	5.67±0.12	5.54±0.18	0.79±0.05	-	-	11.99
9.	Lychee juice	4.17±2.12	4.18±2.10	1.22±3.80	-	-	9.11
10.	Cola flavor soda	5.34±0.32	5.88±0.28	0.03±0.07	-	-	11.25
11.	Lemon-lime flavor soda	4.46±1.42	4.52±1.47	4.61±1.06	-	-	13.59
12.	Energy drink	9.10±1.39	9.91±1.49	0.05±0.28	-	-	19.05
13.	Soy milk commercial	0.03±0.04	0.03±0.06	9.39±2.02	0.18±0.22	-	9.63
14.	Soy milk vender-made	0.07±0.10	0.11±0.17	6.00±0.36	-	-	6.18
15.	Milk sugar added plain	0.04±0.11	-	3.77±0.59	2.85±1.47	-	6.67
16.	Milk sugar added strawberry	-	0.06±0.06	6.82±0.69	1.58±1.82	-	8.48
17.	Milk sugar added chocolate	0.03±0.03	0.03±0.08	7.84±1.01	2.20±0.74	-	10.10

No.	Food	Glucose	Fructose	Sucrose	Lactose	Maltose	Total

18.	**Milk sweetened Vietnam**	**-**	**-**	**3.92±0.99**	**0.65±0.74**	**-**	**4.57**
19.	**Milk sweetened Thai/Cambodia**	**0.03±0.06**	**0.02±0.05**	**3.64±0.30**	**2.05±0.24**	**-**	**5.75**
20.	**fermented lactic drink Orange**	**0.24±0.25**	**0.23±0.14**	**8.42±4.38**	**0.80±0.43**	**-**	**9.69**
21.	**fermented lactic drink strawberry**	**0.21±0.24**	**0.20±0.15**	**7.88±4.61**	**0.81±0.51**	**-**	**9.09**
22.	**Milk plain Thai/Cambodia**	**-**	**-**	**-**	**1.28±0.01**	**-**	**1.29**
23.	**Milk low-fat Thai/Cambodia**	**-**	**-**	**-**	**1.98±0.58**	**-**	**2.01**
24.	**Cocoa/Chocolate drink**	**0.13±0.04**	**0.16±0.09**	**6.55±2.89**	**1.47±0.69**	**-**	**8.31**
25.	**Children's milk drink**	**0.08±0.17**	**0.11±0.11**	**3.26±1.77**	**0.50±0.58**	**-**	**3.96**
26.	**Jelly drink**	**2.77±2.43**	**3.42±2.96**	**5.97±4.79**	**-**	**-**	**12.16**

3.3-2 < Snacks >

No	**Food**	**Glucose**	**Fructose**	**Sucrose**	**Lactose**	**Maltose**	**Total**
27.	**Orange candy**	**11.97±1.08**	**1.38±0.68**	**42.67±6.95**	**-**	**15.50±0.00**	**75.88**
28.	**Buttermilk candy**	**2.09±0.77**	**0.41±0.31**	**45.05±5.83**	**2.96±3.69**	**17.20±2.15**	**70.17**
29.	**Jelly snack (cup)**	**1.18±0.85**	**1.12±0.80**	**13.78±4.71**	**-**	**-**	**16.08**
30.	**Jelly snack (tube)**	**0.33±0.18**	**0.32±0.18**	**7.79±3.09**	**-**	**-**	**8.44**
31.	**Gummy candy**	**3.87±0.72**	**1.89±1.24**	**33.03±2.66**	**-**	**20.76±6.61**	**58.25**
32.	**Custard cake**	**0.51±0.25**	**0.16±0.22**	**24.67±3.49**	**0.22±0.53**	**-**	**25.56**
33.	**Chocolate cake**	**0.76±0.54**	**0.36±0.36**	**31.12±5.40**	**1.13±2.56**	**-**	**33.37**
34.	**Vanilla cake**	**0.29±0.16**	**0.18±0.11**	**30.36±6.53**	**0.44±0.51**	**-**	**31.29**
No	**Food**	**Glucose**	**Fructose**	**Sucrose**	**Lactose**	**Maltose**	**Total**
35.	**Stick wafer**	**0.06±0.05**	**0.06±0.04**	**37.84±2.15**	**0.88±1.52**	**-**	**38.84**

36.	**Wafer**	**0.17±0.27**	**0.27±0.18**	**27.35±1.55**	**0.86±0.16**	**-**	**28.65**
37.	**Chocolate**	**0.02±0.02**	**0.09±0.03**	**61.29±5.05**	**4.73±4.55**	**-**	**67.92**
38.	**Chinese-style local cake Baked: Green beans inside**	**1.16±0.36**	**0.99±0.41**	**34.87±10.98**	**-**	**-**	**37.01**
39.	**Chinese-style local cake Fried: Green beans inside**	**0.13±0.00**	**0.09±0.02**	**27.43±6.89**	**-**	**-**	**27.66**

3.3-3 < Yogurt >

No	Food	Glucose	Fructose	Sucrose	Lactose	Maltose	Total
40.	**Yogurt plain Commercial**	**0.03±0.02**	**0.04±0.04**	**7.47±0.70**	**2.31±1.01**	**-**	**9.85**

3.3-4 < Ice Cream>

No	Food	Glucose	Fructose	Sucrose	Lactose	Maltose	Total
41.	Ice Cream chocolate flavored Local-vender made	-	-	8.71±0.03	0.08±0.01	-	8.84
42.	Ice Cream chocolate Shop	0.59±0.08	0.43±0.04	7.08±0.34	0.65±0.29	-	8.75
43.	Ice Cream chocolate Commercial	0.55±0.19	0.41±0.13	6.95±0.53	0.59±0.16	-	8.50
44.	Ice Strawberry flavored Local-vender made	0.02±0.01	0.03±0.01	6.15±0.10	-	-	6.24
45.	Ice Cream strawberry Shop	1.81±0.41	1.54±0.17	4.72±0.94	0.80±0.04	-	8.88
46.	Ice Cream strawberry Commercial	1.35±0.68	1.01±0.59	5.47±1.26	0.63±0.13	-	8.46