

English Summary

Title : Sugar Intakes from Snacks and Beverages in Vietnamese/Cambodian and Japanese

Children

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Because of the tastiness of sugar, it is easy to consume more than an adequate amount. There are many research reports that excess sugar intake contributes to obesity, diabetes etc. The production of isomerized sugars such as high fructose corn syrup (HFCS) has been increasing in recent years worldwide. This trend has also been seen in Japan. One reason is that isomerized sugars are produced from starches in factories; therefore their production is stable and their price can be kept low. In addition, their liquid form makes it easier to add them to beverages. Currently, many research reports that over-intake of sugars/sweeteners made from HFCS (mainly in beverages) is a cause of disease, in particular obesity, have attracted considerable attention, particularly in the US. Continuing economic development in Southeast Asian countries has improved their standard of living compared to the past. This situation has made it easier than before for people to consume more sugars in their daily life. The percentage of obesity has been increasing rapidly in Asian countries: its ratio in Malaysia is over 40%; in Thailand, Singapore and the Philippines it is around 30%.

Vietnam and Cambodia are neighboring countries where the research for this dissertation was conducted. Their eating habits and available foods are similar. Since the dietary life-styles are also similar, both countries were treated as the same area: Vietnam/Cambodia. In Vietnam/Cambodia, the incidence of obesity and diabetes has been increasing, and this may be caused by excess energy intake from over-consumption of beverages, etc. However, for

Vietnam/Cambodia, a sugar composition table that includes sucrose, glucose, fructose, lactose and maltose has not been available and it has not been possible to estimate sugar intake.

In Study 1, glucose, fructose, sucrose, lactose and maltose in 46 commonly used sugar-rich foods (at least 3 samples from different manufacturers of each food) were analyzed by the enzymatic method and a sugar composition table of beverages and snacks for Vietnam/Cambodia was developed. The snacks and beverages that were available in both countries were included in the sugar composition table. However, natural fresh fruits and milk without added sugar were excluded.

In Study 2, the sugar intake of children from snacks and beverages was studied by using this sugar composition table. Nutrition surveys were conducted in urban and rural Vietnam/Cambodia and in three prefectures in Japan. Nutrition surveys of children 7, 10 and 13 years old in urban Vietnam/Cambodia (n=134) and in selected areas of Japan (n=151) and of those 10 years old in rural Vietnam/Cambodia (n=347) were conducted for 3 consecutive days by the 24 h recall method. Sugar intake in Vietnamese/Cambodians was estimated by using the sugar composition table constructed previously. Sugar intake in Japanese children was studied by using the previously published sugar composition table.

According to the survey results, the height and weight of children in urban Vietnam/Cambodia and in Japan were similar at the age of 7 but Japanese children gradually became larger as they aged. The height, body weight and BMI in rural Vietnam/Cambodia were lower than those in urban Vietnam/Cambodia and in Japan. Energy intake in urban and rural Vietnam/Cambodia was lower than in Japan. Since there were no significant differences in sugar intake among ages and genders in each area, data were combined for all the subjects in each area. Total sugar intake (g/day/person) in these three areas (urban Vietnam/Cambodia

26.9±24.9 rural Vietnam/Cambodia 17.9±18.1, Japan 25.7±16.2) was within WHO recommendations; however, the intake in rural Vietnamese/Cambodian children was lower than that in Japan and in urban Vietnam/Cambodia. Intakes of glucose and fructose were 5.7g and 6.3g in urban Vietnam/Cambodia, 1.2g and 2.1g in rural Vietnam/Cambodia, and 3.3g and 3.4g in Japan, respectively. Intakes of glucose and fructose in urban Vietnam/Cambodia and Japan were similar. Since these sugars are not commonly contained in foods and the ratio of these sugars is usually 1:1, these sugars might be from isomerized sugar. The intake of glucose + fructose was 46% of total sugar intake in urban Vietnam/Cambodia, while it was 26% in Japan and was only 17% in rural Vietnam/Cambodia. Lactose intake of Japanese children was about 2 times higher than that of urban and rural Vietnamese/Cambodian children, which may suggest that the consumption of milk beverages with added sweeteners in Vietnam/Cambodia was lower than in Japan.

In this survey, although the ratio of isomerized sugar intake in urban Vietnam/Cambodia was high, a relationship between sugar intake and body weight could not be observed. Nevertheless this may suggest that the obesity-related health problems that have been occurring mainly in developed countries such as the U.S may be spreading to developing countries.

In conclusion, the first sugar composition table of beverages and snacks for Vietnam/Cambodia has been developed and surveys have been conducted for sugar intake of children in urban and rural areas of Vietnam/Cambodia and Japan. The sugar intakes were within the WHO recommendation; however there were high isomerized sugar intakes for children in urban areas of Vietnam/Cambodia.