



## A healthier society with sugar restriction plan from childhood

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### Keywords

Low Carbohydrate Diet; Sugar-Sweetened Beverages; Artificially Sweetened Beverages; National Diet and Nutrition Survey; Quality-Adjusted Survival Years; Meal Tolerance Test

### Abbreviation

LCD: Low Carbohydrate Diet; SSBs: Sugar-Sweetened Beverages; ASBs: Artificially Sweetened Beverages; NDNS: National Diet and Nutrition Survey; QALY: Quality-Adjusted Survival Years; MTT: Meal Tolerance Test

Obesity and sugar intake are major problems worldwide. They have large medical, economic and social impacts and influences. Concerning these topics, meaningful studies were recently reported from the United States (US) [1] and the United Kingdom (UK) [2]. The author and colleagues have continued clinical research of low carbohydrate diet (LCD) for long years. In this editorial, key points of these topics are described.

Firstly, there have been several studies in the United States about sugar-sweetened beverages (SSBs) intake and increased risk for arteriosclerotic diseases. According to previous epidemiological investigations, SSBs intake has caused a higher risk of diabetes, coronary heart disease, and stroke [3,4]. National Health and Nutrition Examination Survey (NHNES) data showed a relationship between baseline intakes of added sugar and SSBs with elevated CVD mortality [5].

As to public health interest, the influence of SSBs or artificially sweetened beverages (ASBs) were recently investigated in many cases [1]. Subjects were 37716 men from the Health Professional's Follow-up Study and 80647 women from the Nurses' Health study. SSBs showed the influence for elevated mortality risk, in which the hazard ratio of CVD and cancer was 1.31 and 1.16, respectively with significant difference [1]. From the viewpoint of clinical perspective, ASBs can be used to replace SSBs in the case of habitual SSB consumers. However, higher consumption of ASBs is not be recommended.

Secondly, there has been researching in the UK concerning the relationship between obesity and complications. Obesity rates among adults in the UK increased from 15% (1993) to 26% (2016) [6]. As lifestyle habits are important, obesity may start from childhood. Obesity prevalence in the UK has been 10% at 4-5 years old and 20% at 11-12 years old with health and educational problems [6]. Consequently,

the UK government started the project on children's obesity [7]. Public Health England has launched a medical and social anti-obesity plan, which has three aspects [8]. They are

1. a reformulation of products with less sugar.
2. reducing product size.
3. rebalancing sales weighting (shifting to lower sugar alternatives).

The government of the United Kingdom has presented an announcement in 2017. The plan was to reduce the sugar amount by 20% in certain food and confectionery by 2020 [8]. Moreover, the England Public Health Service (PHS) announced the reduction of calorie intake by 11%. Its detail method was to set sugar intake at the level of 5% of consuming calories a day. This can decrease the number of sugar-related deaths about 4700 per year. It can also decrease annual cost by £576 million from the medico-economic point of view. Currently, the research team of Oxford University has proposed the prospective assessment for the probable health benefits of reducing sugar, and they reported the detail in the *British Medical Journal* (2019.4) [2].

The research group has investigated the influence of sugar reduction plan on some factors, such as obesity, diabetes, impacts for diseases and healthcare costs [8]. They have proceeded the modeling study in order to examine the efficacy of the sugar reduction on the obesity of child and adult. They analyzed several data such as the results of National Diet and Nutrition Survey (NDNS) and Food Consumption and Nutrient Content data of England in the National Diet and carried out the scenario analysis for 20% reduction of sugar. Data were used from more than 1500 England residents aged 4–80 years old [8].

As for the research protocol of adults and children, primary outcomes were set as the changes in weight, BMI and calories [2]. In adults cases, quality-adjusted survival years (QALY) and health care costs were analyzed. As the results of 10 years, diabetes was reduced by 154, 550 cases, and the economic cost was reduced by £ 285.8 million. When the sugar reduction plan was executed, the results would be predicted that the calorie intake decrease is 25 kcal (4-10 years), 25

kcal (11-18 years), 19 kcal (19-80 years), respectively [2]. Calculating the changes in body weight and BMI, the prediction of obese reduction ratio would be 5.5% (4-10 years), 2.2% (11-18 years) and 5.5% (19-80 years) in comparison with the baseline level, respectively. Concerning the effect of QALY, diabetes is expected to decrease 89 thousand female cases, and 65 thousand male cases for 10 years. Similarly, the total cost of medical care is expected to be decreased by £ 286 million [2].

This sugar reduction plan includes three approaches, which is a reduction in serving size, change of product composition, change of sales focus. If one of them fails to continue, the preventive efficacy may be attenuated. The government can estimate it possible to succeed in the plan without unexpected changes in the situation of three approaches. Sugar problem has to be solved as a key public health target. Taxes for sugary drinks have been already introduced in France, Mexico, and Hungary [9]. The purpose of the study is to estimate the impact of sugar reduction program to obese adult and child of the UK in the future.

Thirdly, related to these researches, author and colleague have spread LCD in our clinical practice and research for patients with diabetes, obesity and metabolic syndrome. We proposed three levels of LCD meal, which are petite-LCD, standard-LCD, and super-LCD with carbohydrate ratio 40%, 26%, 12%, respectively [10]. These idea has been practical, useful and beneficial for many healthy people and patients with diabetes. LCD treatment has brought gestational DM patients drastic improvement of glucose variability and hyperketonemia. Our research has clarified the physiological important role of ketone bodies in pregnant mother, newborn, placenta and fetus [11]. Furthermore, we have compared the difference in blood variability between calorie restriction (CR) and a low carbohydrate diet (LCD) [12]. Only two days of LCD can bring the remarkably decreased daily profile of blood glucose [13], and breakfast of CR including 70g carbohydrate can be applied by meal tolerance test (MTT) similar to 75g oral glucose tolerance test (75gOGTT) [14].

In summary, recent topics concerning obesity, sugar intake, and its risk, economic and social influence, CR and LCD have been described in this article. Carbohydrate restriction seems to have an advantageous direction for preventing arteriosclerosis and maintaining our health. I hope that current information would be beneficial and reference to the future development of clinical practice and research.

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