

Relationship between Birth Weight and Future Cardiovascular Risks in Japanese in View of the Developmental Origins of Health and Disease (DOHad) Theory

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Metabolic syndrome is a combination of cardiovascular risk factors that, in turn, increase the risk of developing coronary heart disease and cerebrovascular disease. Lifestyle-related diseases may occur as a result of the interaction between genetic disposition and lifestyle, but the incidence of every lifestyle-related disease cannot be explained only by this idea^{1, 2)}. Poor nutrition in early life has been suggested to increase susceptibility to the effects of an affluent diet. The developmental origins of health and disease (DOHad) theory suggests that dispositions for health and development of disease are formed during the fetal/infant period (Fig. 1). Umemoto *et al.* showed a negative relationship between the birth weight and the risks of hypertension and glucose tolerance in middle-aged individuals³⁾. Since the original suggestion of a relationship between birth weight and the later development of type 2 diabetes and metabolic syndrome, these findings have been replicated in various populations^{4, 5)}. There is, however, limited evidence in Japanese populations. However, these data are especially important for Japanese women because the tendency for imposed malnutrition in young Japanese women may further accelerate the ratio of low-birth-weight infants and may increase the incidence of cardiovascular disease in later life^{6, 7)}.

Previous studies conducted in Japan indicated associations between birth weight and adverse conditions such as diabetes mellitus and hypertension in children⁸⁾. However, few epidemiologic studies have targeted middle-aged populations because most reports have focused on individuals during their childhood or young adulthood. The study by

Umemoto *et al.* is unique because they investigated the relation between birth weight and cardiovascular effects in a middle-aged population³⁾.

Katsuragi *et al.* also suggested in the Suita Study that women with low birth weights have risks for hypertension and glucose tolerance in the future⁶⁾. However, these tendencies were not observed in men. There are two reasons for these gender differences. The first is differences in lifestyle between men and women. In the Suita study, 7% of women were smokers, and their alcohol consumption rate was 31%, which were less than half of the rates in men⁶⁾. Therefore, compared with men, lifestyle plays a lesser role in women, and epigenetics may have more influence on the occurrence of hypertension and diabetes mellitus in the future. The second reason is the changes in body mass index (BMI) in men and women between 1980 and 2010. In Japan, the BMI of women in their 20s decreased from 21.0 in 1980 to 20.4 in 2010 and that of women in their 30s decreased from 22.5 to 21.5, indicating that a tendency toward thinness prevailed among young women over the past 30 years⁹⁾. However the BMI of men of all ages increased during this period, and 2007 was called the “The first year of metabolic diseases in Japan,” and more than 70% of metabolic diseases have been recorded in men.

DOHad data teaches us the importance of proper nutrition in Japanese. Women should take adequate amounts of energy since their childhood. Education for proper energy intake should be started before puberty when they pay attention to their bodies and long to be slim. Young women should be educated that malnutrition before and during pregnancy highly elevates the risks for not only cardiovascular diseases but also learning memory impairment in the next generation¹⁰⁾. The current maternal and child health

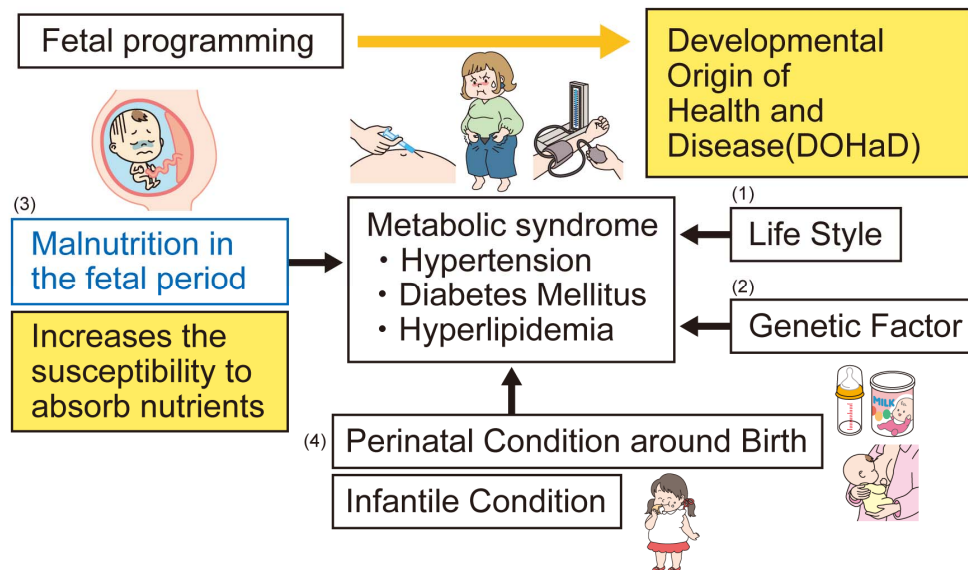


Fig. 1.

In addition to (1) lifestyle and (2) genetic factors, (3) malnutrition in the fetal period increases the susceptibility to absorb nutrients and has become the third leading cause of metabolic syndrome. This mechanism is called epigenetics and is also known as fetal programming. Further (4) perinatal condition around birth and infantile condition also affect the occurrence of diseases during adulthood. These mechanisms are called developmental origin of health and disease (DOHaD).

handbook does not describe the relationship between low birth weight and future risks of lifestyle-related diseases. Accordingly, additional education for brides and women who wish to become pregnant, with information regarding potential risks for small birth physique, can help improve the health of the next generation.

Disclosures

None.

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