

Association between low birth weight, excessive weight gain and heart problems in later life

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Researchers who have followed 5,840 people from before birth to the age of 31 have found evidence suggesting that small size at birth and excessive weight gain during adolescence and young adulthood may lead to low grade inflammation, which, in turn, is associated with an increased risk of developing heart disease.

Previous epidemiological studies have linked environmental factors in early life with the risk of disease in adulthood, and this study identifies a possible causal mechanism. The study, which is published in Europe's leading cardiology journal, the *European Heart Journal* today (Thursday 10 April), underlines the important role of healthy lifestyles, from the foetal period, through childhood, adolescence and young adulthood, in preventing heart problems.

The researchers used a protein called C-reactive protein (CRP) as a marker for general inflammation. CRP is secreted from the liver, is present in blood, and slightly elevated levels can indicate a chronic inflammatory state (low grade inflammation, as opposed to acute inflammation).

“Low grade inflammation is important because it has been associated with future cardiovascular events in many population studies over the past few years and it may play a role in the development of cardiovascular disease,” explained one of the authors, Paul Elliott,

Professor of Epidemiology and Public Health Medicine and head of the Department of Epidemiology and Public Health at Imperial College London.

Prof Elliott and his colleagues found that when the Finnish participants in the study reached the age of 31, CRP levels were 16% higher per 1 kg lower birth weight, 21% higher per 10cms shorter length at birth, and 24% higher per 1 kg/m³ lower at birth (kg/m³ is known as ponderal index), after adjusting for potential confounding factors. People who were amongst the smallest at birth, but who then put on the most weight up to the age of 31, had the highest average CRP levels. Every extra kg/m² (body mass index, BMI) gained from the age of 14 to 31 was associated with a 16% rise in CRP levels; this association was greatest for people who had the highest BMI at 14.

Dr Ioanna Tzoulaki, the first author of the study and Lecturer in Epidemiology at the Department of Epidemiology and Public Health, Imperial College London, said: “We compared birth weight of children participating in the Finland 1966 Birth Cohort study with their CRP levels at age 31, and we found that those who had lower birth weight, have higher CRP levels when they are adults, and also the other way round – people who had higher birth weight had lower CRP levels as adults. The ‘lower’ and ‘higher’ CRP levels are relative to measurements in other participants in the study.

“These findings lead us to conclude that small size at birth and excessive weight gain during adolescence and young adulthood may predispose to low grade inflammation, which, in turn, is associated with increased risk of developing cardiovascular disease.”

In their EHJ report, the authors say: “The finding that weight gain from adolescence to young adulthood appears to play a greater role in low grade inflammation than weight in adolescence per se, could have

important implications for the primordial prevention of cardiovascular disease. Promoting healthier lifestyle in childhood and adolescence, leading to weight stabilisation might be a crucial step in establishing a low cardiovascular risk profile in young adults.”

The authors discuss several possible mechanisms and conclude that the results of their study suggest that low birth weight, followed by a greater than average increase in BMI, may trigger the production of the low grade inflammatory response.

Prof Elliott further explained: “Low birth weight has been associated with future cardiovascular diseases and type II diabetes in many studies. This study adds to them and provides a possible explanation for their findings: that this association might be mediated through the effects of birth size on low grade inflammation, as measured by CRP levels.

“There is now ample evidence indicating the importance of the prenatal and early life environment for an individual's future health, and advice should be given to prospective parents, especially concerning the importance of a healthy diet and the avoidance of exposure to tobacco smoke during pregnancy and childhood – all factors that can impact on the weight of a child at birth. It is also essential that suitable advice is given to children, teenagers and young adults about the effect that excessive weight gain may have on their future cardiovascular health.”

Few heart-related problems have appeared among the study participants because they are still relatively young. However, the researchers intend to follow them for at least another 20 years, in order to explore further the associations between small size at birth, weight gain, low grade inflammation and the number of cardiovascular problems that will occur.

Source: European Society of Cardiology

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