Obesity can cause cardiovascular ill-health, even in the young

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Higher than normal body mass index (BMI) is known to lead to cardiovascular ill-health in mid-to-late life, but there has been limited investigation of its effect in young, apparently healthy, adults. Researchers have now shown that having a higher BMI can cause worse cardiovascular health in those aged as young as 17, according to a study to be presented to the annual conference of the European Society of Human Genetics today (Sunday).

Dr Kaitlin Wade, a Research Associate at the Medical Research Council Integrative Epidemiology Unit (MRC-IEU) at the University of Bristol, Bristol, UK, and colleagues used data from The Avon Longitudinal Study of Parents and Children (ALSPAC) to investigate the potential link between increased BMI and cardiovascular health. "ALSPAC is a world-leading birth cohort study, started in the early 1990s with the inclusion of more than 14,000 pregnant mothers and their partners and children, and provides an excellent opportunity to study environmental and genetic contributions to a person's health and development. It was therefore ideal for this purpose," Dr Wade will say.

The researchers hypothesised that cardiovascular risk due to increased BMI was likely to emerge in earlier life. The design of existing observational studies (those just looking for associations in the population) have meant that they are unable to make a distinction between correlation and causation. The MRC-IEU specialises in the use of genetics to help these difficult analytical situations and in this case researchers were able to use genomic data from ALSPAC to detect the

likely causal relationship between higher BMI and higher blood pressure and left ventricular mass index (LVMI) in those aged 17 and 21. A thickening of the left ventricle in the heart (hypertrophy) means that it has to work harder to pump blood and is a common marker for heart disease.

Higher BMI did not appear to have an effect on heart rate in these young adults, although previous studies have shown an association - most likely due to bias caused by the mixing of effects of an additional factor resulting in a distortion of the true relationship (confounding). "Our results showed that the causal impact of higher BMI on cardiac output was solely driven by the volume of blood pumped by the left ventricle (stroke volume). This, at least in part, can explain the causal effect of higher BMI on cardiac hypertrophy and higher blood pressure that we observed in all our analyses," says Dr Wade.

The results support efforts to tackle the obesity epidemic from an early age in order to prevent the development of cardiovascular changes known to be precursors of cardiovascular ill-health and disease. "It is the first time that the nature of this relationship has been shown in group of young adults where it has been possible to draw improved conclusions about its causation," says Dr Wade.

The researchers are now trying to untangle the relationship between higher BMI and disease mechanisms including metabolomics (the study of the chemical processes involved in the functioning of cells and the abundance and diversity of microbes living in the gut - the gut microbiome). "We have also begun an analysis of the causal role of higher BMI on detailed measures of cardiac structure and function within the ALSPAC data. We hope to further explore these associations within an older population - the UK 1946 birth cohort.

"Whilst randomised controlled trials are important for disentangling

cause and effect in disease, they are expensive, time-consuming and labour-intensive. Modern genomics allows us to detect causality more quickly and cheaply, and the availability of large quantities of genetic data means that we can overcome the limitations of observational epidemiological studies. We believe that there are clear messages for cardiovascular health in our findings and we hope that they may lead to increased efforts to tackle obesity from early life," Dr Wade will conclude.

Chair of the ESHG conference, Professor Joris Veltman, Director of the Institute of Genetic Medicine at Newcastle University¸ Newcastle, United Kingdom, said: "Distinguishing between correlation and causation is tremendously difficult in medical sciences, especially for complex interactions like those between obesity and cardiovascular disease. In this study, statistical genetics approaches were applied to longitudinal cohorts from the UK to improve this. The scientists could demonstrate that obesity also causes poorer cardiovascular health in young adults. In contrast, higher BMI did not seem affect heart rate in this group."

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