

Study shows shorter people are at higher risk of type 2 diabetes

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Short stature is associated with a higher risk of type 2 diabetes, according to a new study in *Diabetologia* (the journal of the European Association for the Study of Diabetes). Tall stature is associated with a

lower risk, with each 10cm difference in height associated with a 41% decreased risk of diabetes in men and a 33% decreased risk in women.

The increased risk in shorter individuals may be due to higher liver fat content and a less favourable profile of cardiometabolic risk factors, say the authors that include Dr. Clemens Wittenbecher and Professor Matthias Schulze, of the German Institute of Human Nutrition Potsdam-Rehbruecke, Germany, and colleagues.

Short stature has been linked to higher risk of diabetes in several studies, suggesting that height could be used to predict the risk for the condition. It has been reported that insulin sensitivity and beta cell function are better in taller people. Short stature is related to higher cardiovascular risk, a risk that might in part be mediated by cardiometabolic risk factors relevant to type 2 diabetes—for example blood pressure, blood fats and inflammation.

This new study used data obtained in the European Prospective Investigation into Cancer and Nutrition (EPIC) - Potsdam; a study that included 27,548 participants—16, 644 women aged between 35 and 65 years and 10,904 men aged between 40 and 65 years—recruited from the general population of Potsdam, Germany between 1994 and 1998.

A variety of physical data were collected from participants, including body weight, total body height and sitting height (with leg length calculated as the difference between the two), waist circumference and blood pressure. For this study, a sub-cohort of 2,500 participants (approx. 10%) was randomly selected being representative for the full study.

Those with diabetes already or lost to follow up were excluded, leaving 2,307 for analysis. In addition, 797 participants of the full cohort who went on to develop type 2 diabetes were included. Of these, an

investigation of potential mediating factors was carried out for 2,662 participants (including 2,029 sub-cohort members and 698 diabetes cases).

The study found that the risk of future type 2 diabetes was lower by 41% for men and 33% for women for each 10cm larger height, when adjusted for age, potential lifestyle confounders, education and waist circumference.

The association of height with diabetes risk appeared to be stronger among normal-weight individuals, with an 86% [lower risk](#) per 10cm larger height in men, and 67% lower risk per 10cm larger height in women. In overweight/obese individuals, each 10cm larger height was associated with diabetes risk being 36% lower for men and 30% lower for women. The authors say: "This may indicate that a higher diabetes risk with larger waist circumference counteracts beneficial effects related to height, irrespective of whether larger [waist circumference](#) is due to growth or due to consuming too many calories."

Larger leg length was associated with a lower risk of diabetes. A slight sex difference was noted—for men a larger sitting height at the cost of leg length related to increased risk, whilst amongst women both leg length and sitting height contributed to lower risk. The authors suggest that, among boys, growth before puberty, which relates more strongly to leg length, will have a more favourable impact on later diabetes risk than growth during puberty (assuming that truncal bones are the last to stop growing). For girls both growth periods seem to be important.

The authors also calculated to what extent the inverse associations of height and height components with type 2 diabetes risk are explainable by liver fat (measured as Fatty Liver index) and other cardiometabolic risk factors. When the results were adjusted for liver fat content, the men's reduced risk of diabetes per 10cm larger height was 34%

(compared with 40% in the overall results), and the women's reduced risk was just 13% compared with 33% in the overall results.

Other biomarkers also affected the results: in men adjustment for glycated haemoglobin (a measure of blood sugar) and blood fats each reduced the risk difference by about 10%. In contrast, among women adjustment for adiponectin (a hormone involved in blood sugar control) (-30%) and C-reactive protein (a marker of inflammation) (-13%) reduced the associations of height with diabetes, in addition to the reductions observed by glycated haemoglobin and blood fats. Taken together, the authors say that a large proportion of the reduced risk attributable to increased height is related to taller people having lower liver fat and a 'healthier' cardiometabolic profile.

The authors say: "Our findings suggest that short people might present with higher cardiometabolic risk factor levels and have higher diabetes risk compared with tall people..."

These observations corroborate that height is a useful predictive marker for diabetes risk and suggest that monitoring of cardiometabolic risk factors may be more frequently indicated among shorter persons, independent of their body size and composition. Specifically, liver fat contributes to the higher risk among shorter individuals and, because height appears to be largely unmodifiable during adulthood, interventions to reduce liver fat may provide alternative approaches to reduce risk associated with shorter height."

However they add: "Our study also suggests that early interventions to reduce height-related metabolic risk throughout life likely need to focus on determinants of growth in sensitive periods during pregnancy, early childhood, puberty and early adulthood, and should take potential sex-differences into account."

They conclude: "We found an inverse association between height and risk of type 2 [diabetes](#) among men and women, which was largely related to leg length among men. Part of this inverse association may be driven by the associations of greater [height](#) with lower liver fat content and a more favourable profile of cardiometabolic risk factors, specifically blood fats, adiponectin and C-reactive protein."

More information: Clemens Wittenbecher et al. Associations of short stature and components of height with incidence of type 2 diabetes: mediating effects of cardiometabolic risk factors, *Diabetologia* (2019). [DOI: 10.1007/s00125-019-04978-8](https://doi.org/10.1007/s00125-019-04978-8)

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