Genetics could help diagnose diabetes in Indians, study shows

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A new way of using genetics to diagnose diabetes could pave the way for better diagnosis and treatment in Indians, new research has concluded.

Misdiagnosis of diabetes could be an issue in India because of features of diabetes in Indians which might vary from the standard western textbooks. Until recently, it was widely believed that type 1 diabetes appeared in children and adolescents, and type 2 diabetes in obese and older (typically after 45 years of age). However, recent findings have shown that type 1 diabetes can occur later in life, while type 2 diabetes is on the rise among younger and thinner Indians. Distinguishing the two types of diabetes has therefore, become more complex. The two types follow different treatment regimes with type 1 diabetes needing lifelong insulin injections but type 2 diabetes often being managed with diet or tablet treatment. Misclassification of the type of diabetes may lead to sub-standard diabetes care and possible complications.

A new publication conducted between researchers at the KEM Hospital, Pune, CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad, and the University of Exeter in the UK shows that a genetic risk score is effective in diagnosing type 1 diabetes in Indians.

The genetic risk score, developed by the University of Exeter, takes into account detailed genetic information known to increase the chance of developing type 1 diabetes. The score may be used at the time of diabetes diagnosis to help decide if someone has type 1 diabetes.

Up to now, the bulk of research in this field has been conducted in European populations. Now, in a paper published in *Scientific Reports*, researchers have analysed whether the European risk score is effective in diagnosing type 1 diabetes in Indians. The team studied people with diabetes from Pune, India. The team analysed 262 people with type 1 diabetes, 352 people with type 2 diabetes, and 334 people without diabetes. All were of Indian (Indo-European) ancestry. Outcomes from the Indian populations were compared with those of Europeans from the Wellcome Trust Case Control Consortium study.

The research, supported by Diabetes UK, the KEM Hospital Research Centre, Pune and the Council of Scientific and Industrial Research (CSIR) in India, found that the test is effective in diagnosing the right type of diabetes in Indians, even in its current form, which is based on European data. Authors also found genetic differences between the populations which mean the test could be further improved to enhance outcomes for Indian populations.

Dr. Richard Oram, of the University of Exeter Medical School, said: "Diagnosing the right diabetes type is an increasingly difficult challenge for clinicians, as we now know that type 1 diabetes can occur at any age. This task is even harder in India, as more cases of type 2 diabetes occur in people with low BMI. We now know that our genetic risk score is an effective tool for Indians, and can help get people on the treatment they need to avoid life threatening complications such as diabetic ketoacidosis and to achieve the best health outcomes."

Dr. Chittaranjan Yajnik of the KEM Hospital & Research Centre, Pune agrees with Dr. Oram. He said, that the escalating epidemic of diabetes in young Indians makes it imperative that we diagnose the type of diabetes correctly to avoid mistreatment and its long term biological, social and economic implications. The new genetic tool will be a great help in this. It will help decide when diabetes is mainly caused by autoimmune destruction of pancreatic beta cells (type 1 diabetes), and when diabetes is mainly caused by reduced action of insulin due to excess fat and smaller muscle mass in the body of Indians ('thin-fat Indians'), as is the case in type 2 diabetes. He said, "we look forward to using this test in diabetic patients from different parts of India where the physical characteristics of diabetic patients differ from the standard description".

The authors found nine genetic areas (called the SNPs) that correlate with type 1 diabetes both in Indian and European populations, and can

be used to predict the onset of type 1 diabetes in Indians. Dr. GR Chandak, Chief Scientist leading the study at the CSIR-Centre for Cellular and Molecular Biology (CCMB), said: "It's interesting to note that different SNPs are more abundant among Indian and European patients. This opens up the possibility that environmental factors might be interacting with these SNPs to cause the disease."

Given the genetic diversity of the population of India, the study's results need to be validated in other ethnic groups of the country too. Dr. Rakesh K Mishra, Director of the CSIR-Centre for Cellular and Molecular Biology (CCMB), said: "Since more than 20 percent of people with type 1 diabetes below the age of 15 years of age are in India, developing a genetic test kit to reliably detect type 1 from type 2 diabetes holds a lot of significance for the country."

The full paper is titled "Type 1 diabetes genetic risk score is discriminative of diabetes in non-Europeans: evidence from a study in India."

  More information: James W. Harrison et al. Type 1 diabetes genetic risk score is discriminative of diabetes in non-Europeans: evidence from a study in India, *Scientific Reports* (2020). DOI: 10.1038/s41598-020-65317-1

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