PREVENTION OF TYPE 2 DIABETES IN SOUTH ASIAN PEOPLE

Given that people of South Asian origin are more at risk of Type 2 diabetes than the general population, prevention measures are crucial. Dr Jason Gill, Reader in Exercise and Metabolic Health, University of Glasgow, considers how issues like weight management and exercise may influence the success of Type 2 prevention in this ethnic group.
A recent study drawing on data from the UK Biobank showed that Type 2 diabetes risk starts to increase at a body mass index (BMI) of 21.0kg/m² for South Asian men and 26.0kg/m² for Chinese and Black men, compared with 30.0kg/m² for White men. The corresponding figures for women are 22.0kg/m², 24.0kg/m² and 26.0kg/m² compared with 30.0kg/m² for White women.

NICE guidance on Type 2 diabetes prevention does suggest a lower threshold for BMI to trigger action among Asian individuals. This is set at 23kg/m² to indicate increased risk and 27.5kg/m² to indicate high risk among South Asian and Chinese populations. This is somewhat higher than that found in the study quoted above. On this evidence, only 5 per cent of South Asian men and 11 per cent of South Asian women can be said to be at low risk, with their BMI lying below the threshold.

Thus, if BMI is to be used to identify South Asians at increased diabetes risk, then the real target needed is so low that you might as well screen all South Asians. So, this raises the question of whether using BMI thresholds is the best approach to identifying those at high risk of Type 2 diabetes, especially when it comes to targeting lifestyle interventions?

**KEY MESSAGES:** proposed guidance and recommendations for clinicians and public health officials

- Migrant South Asian people have a 2–4 times higher risk of Type 2 diabetes, independent of adiposity, and develop diabetes on average 5–10 times earlier than White European people. This excess risk is best captured in diabetes risk scores that are country or region-specific, which include ethnicity as a predictor.

- Screening for diabetes (by use of HbA1c or fasting glucose) in South Asian people should be guided by risk scores that are ethnically specific or be initiated at lower BMI levels than in White European people.

**Insulin resistance, adiposity**

South Asians have more insulin resistance across the life course, with beta cell exhaustion tending to occur at an earlier age. They have differences in adiposity compared with White Europeans with a higher per cent of body fat and more deep subcutaneous and visceral fat, as well as differences in skeletal muscle (low percentage of lean mass and lower cardiorespiratory fitness).

Cardiovascular risks have improved over time, but retinopathy and renal complications remain high, owing to high levels of glycaemia and more rapid progression of diabetes. No obvious underlying genetic factors have yet been identified, but there is increasing interest in possible epigenetic factors.

To put all this into context, it is useful to look at actual risk scores in two individuals who differ only in their ethnicity. According to the QDiabetes-2014 risk calculator, a White man, aged 60, BMI 25kg/m² living in Glasgow, with no family history of diabetes, will have a 4.7 per cent 10-year risk of developing Type 2 diabetes. A Bangladeshi man, with otherwise the same characteristics, has a 25.2 per cent 10-year risk of developing the condition. If this individual has a positive family history of Type 2 diabetes, then this risk increases to 45.5 per cent.

**Insulin resistance and fitness**

The finding that South Asians are more insulin resistant than Europeans cannot be fully explained by differences in adiposity. Differences in fitness also have an influence. A study compared a group of 20 South Asian men with 20 age and BMI-matched men of White European origin on a range of whole-body and skeletal muscle measures. Besides exercise and metabolic testing, the participants had a muscle biopsy to...
It may be that more aggressive, and earlier, interventions will be needed to make a real difference and that ethnic-specific elements should be included in prevention programmes.

Lifestyle change

Previous research has shown that lifestyle change can prevent, or at least slow down, Type 2 diabetes. For the South Asian community, prevention poses a particular challenge for the reasons described above. Maybe more aggressive, and earlier, interventions, with ethnic-specific elements, will be needed to make a real difference.

A useful start has been made with the Prevention of Diabetes and Obesity in South Asians (PODOSA) study. This is a weight control and physical activity intervention being carried out in two NHS regions in Scotland. Men and women of Indian and Pakistani origin aged 35 or older, with either impaired glucose tolerance or impaired fasting glucose, were recruited and randomised into two groups. The intervention group received 15 visits from a diettian over three years, while the control group received four visits over the same period. Mean weight loss in the intervention group was 1.13kg compared with a mean weight gain of 0.51kg in the control group. Since even modest weight loss can lead to clinical benefit, initiatives like the PODOSA study can hopefully help prevent, or delay, Type 2 diabetes among South Asians.

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IS TYPE 1 DIABETES DIFFERENT IN SOUTH ASIANS?

Dr Parth Narendran, Reader at the University of Birmingham and Consultant in Medicine at Queen Elizabeth Hospital, Birmingham, discusses Type 1 diabetes in South Asians

South Asians (SA) have a higher risk of Type 2 diabetes than the general population. It is less clear whether they also have a higher risk of Type 1, and whether there are ethnicity-related differences in the pathogenesis of the condition, the development of complications, and whether it should be managed differently.

Getting these diagnoses correct is an important area of ongoing research. While auto-antibody, genetic and C-peptide assays have not been fully validated in the SA population, these are still useful, and may be required more frequently to support any clinical diagnosis made in the SA patient with Type 1 diabetes.

There is conflicting evidence on the incidence and prevalence. A study of the prevalence of Type 1 in Bradford showed similar rates in the SA and White European populations, supporting the local audits in Birmingham. However an analysis carried out using data from the Scottish Care Information Diabetes Collaboration suggests that age-standardised prevalence of Type 1 diabetes diagnosed under 40 years of age was approximately a third in South Asians compared with White Europeans. For incidence, the Scottish data again suggests a lower rate in SA groups, but other publications are less clear1,2.

Complications

We have undertaken a systematic review of ethnic differences in risk factors, complications and mortality in people of SA ethnicity with Type 1. Mortality appears to be higher for SA men and women with Type 1 diabetes2 as do cardiovascular and other macrovascular diseases (other than peripheral vascular disease). The limited data suggests that many risk factors for macrovascular disease (BP, total cholesterol, BMI) are broadly similar between SA and White European populations, some better (smoking), and some worse (HDL).

South Asians have similar rates of retinopathy and nephropathy, but lower rates of peripheral neuropathy than White Europeans, but higher HbA1c3,4,5.

In conclusion

In summary, the diagnosis of Type 1 diabetes in South Asians can sometimes be difficult and the pathogenesis of the condition in this population is unconfirmed. There are some interesting differences in the management and natural history of South Asian Type 1 diabetes that need verifying. More research is needed but, as a way forward, here are some pointers: 1 Studies of the incidence, prevalence, and natural history can be improved through better coding for ethnicity on UK health management systems. 2 Antibody and genetic studies of large well-characterised cohorts may aid understanding of Type 1 pathogenesis. 3 Owing to the higher insulin resistance associated with the SA ethnicity, adjunctive therapies that target this may show benefit in this sub-population compared with White Europeans.

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In the UK, British and Minority Ethnic groups have a higher prevalence of Type 2 diabetes than the local White population. These differences were highlighted in the SABRE (Southall and Brent Revisited) study, which is the largest tri-ethnic study ever carried out in the UK. SABRE showed that the diabetes risk for people of South Asian ethnicity was 3–4 times greater and for those of African Caribbean ethnicity 2.5–5 times greater than the local White population. SABRE also found that within the BAME groups there were differences in risk factors, with South Asians showing features such as central obesity and dyslipidaemia, while hypertension was more common in African-Caribbeans.

Genes or environment? Both genetic or environmental factors may underpin the increased risk of Type 2 diabetes found in South Asian people. Earlier onset of Type 2 diabetes at much lower BMI and family history suggests a strong genetic component in many South Asians. However, genetic studies have so far not identified significant differences that can fully explain the additional risk in this population.

There is good evidence to suggest that environmental factors have a significant influence on the risk of Type 2 diabetes, or at least account for increased incidence seen in recent years. South Asian diets have a higher carbohydrate and saturated fat content, for instance. Furthermore, South Asians undertake significantly less physical activity compared with local White Europeans. These changes in diet and exercise habits are exaggerated in migrant populations, which further predisposes them to both obesity and Type 2 diabetes.

Studies in India looking at the effects of environmental change on diabetes prevalence in rural populations show marked increases in diabetes prevalence over a short period of time. Improvement in living standards, increase in television viewing, use of motorised transport, and having three meals a day have all increased with prosperity and contribute...
to increased metabolic risk.

South Asians tend to develop the condition at a much lower BMI than their White European counterparts. This may be due to the fact that they tend to store relatively more abdominal fat. It may also be linked to inadequate beta cell response. It is possible that the underlying beta cell dysfunction may be unmasked at much lower levels of obesity. This is an area that is worthy of further research.

Early life programming may also be a contributing environmental factor. There is emerging evidence to suggest that maternal environment can influence the offspring’s risk of obesity and Type 2 diabetes over the life course. Both maternal over- and under-nutrition can contribute to obesity and related metabolic disorders in later life. Exactly how these epigenetic mechanisms contribute to the excess risk of Type 2 diabetes is not well understood.

Differences in outcomes

Black, Asian and Minority Ethnic people have around 50 per cent higher coronary heart disease-related mortality when they have Type 2 compared with the general population. The risk of cardiovascular disease increases significantly around the age of 50 years for South Asian males and at 60 years for South Asian females. The United Kingdom Asian Diabetes Study (UKADS) showed that cardiovascular events occur at least seven years earlier in South Asians with Type 2 diabetes compared with White Europeans. Death from cardiovascular causes was more common among South Asians compared with White Europeans.

South Asians also have significantly higher rates of retinopathy and maculopathy, and increased risk of diabetic nephropathy and end stage renal disease are also observed. Although the prevalence of microalbuminuria is similar in South Asians and White Europeans, the prevalence of overt proteinuria is much greater in South Asians and there is also a greater need for renal replacement therapy, as was shown by the UKADS study. South Asians are also more likely to be diagnosed with gestational diabetes and have poorer outcomes than their White counterparts.

Research has shown that these increased risks can be explained by poorly controlled risk factors. Although there is some suggestion that South Asians have a higher predisposition to nephropathy, at present there is insufficient evidence to support the argument that Type 2 diabetes in South Asians is more aggressive than in other ethnic groups. In fact, the findings from the UKPDS study show that there are...
minimal differences between the ethnic groups in the rate of decline of beta cell function or response to treatment.

**Healthcare inequalities**

Black, Asian and Minority Ethnic groups have higher levels of socio-economic deprivation compared with the general population. There is, however, considerable heterogeneity within the BAME groups, with those of Bangladeshi origin tending to be more disadvantaged.

The introduction of the Quality and Outcomes Framework has helped address inequalities. But there are still major deficiencies in managing risk factors. Poor knowledge among healthcare professionals about the specific needs of BAME groups, cultural factors and lack of resources may be contributing factors. All this should be taken on board when services are being commissioned.

The **way forward**

The problem of Type 2 diabetes can only be tackled by an effective prevention strategy. Tackling obesity alone can significantly reduce the burden of the condition. Indeed, there would be 7,000 fewer people with Type 2 diabetes in 2030 if obesity rates remained stable (rather than increasing, as they now are). While the diabetes prevention strategy is a step in the right direction, the responsibility for diabetes prevention lies not just with the state, but also with communities, the family and, of course, individuals themselves.

There should be proactive management of risk factors in BAME groups, linked to culturally sensitive education. The Diabetes UK Community Champions (see page 16) have an important role to play in all this. Beyond these efforts there are, of course, more challenging issues of addressing cultural behaviours and deprivation among BAME groups. Finally, Diabetes UK has a key role to play. The charity can help shape policy, influence commissioning, develop resources and define research priorities.

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