Diabetes prevention in high-risk ethnic groups

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Aims

• Ethnic disparities in diabetes risk

• Importance of lifestyle to ethnic health

• Prevention programmes for ethnic minorities
Diabetes since 1980

Per 100 Million

1980 level

108 million = 1 in 25

422 million = 1 in 11

Not explained by population growth

Explained by population growth

1980 level

2014
Diabetes prevalence and incidence in the UK

Consistent with other countries

Glucose response to mixed meals

Data taken from Yates et al. The journals of gerontology. Series A 2018
doi: 10.1093/gerona/gly252
Insulin response to mixed meals

Error Bars: +/- 1 SE

Data taken from Yates et al. The journals of gerontology. Series A 2018
doi: 10.1093/gerona/gly252
UK Biobank data

HbA1c

Triglycerides

Cholesterol-HDL ratio

C-reactive protein
Conclusions Part 1

- South Asian phenotype at particularly high risk of insulin resistance and type 2 diabetes
- Risk greater than White European and other ethnic groups
Part 2

Importance of body weight and lifestyle factors
BMI and diabetes prevalence

Fat overspill

From www.myhealthywaist.org
Associations between physical activity and health

Odds of impaired glucose regulation by ethnicity and activity (Yates et al. 2012)

P = 0.013 for interaction

Impact of exercise on lipids

![Graph showing the impact of exercise on lipids over time.](image)

Exercise and insulin resistance

Data from the Leicester Go for IT trial
Physical activity for adults and older adults

Benefits health
- Type II Diabetes -40%
- Cardiovascular disease -35%
Improves sleep
- Falls, depression etc. -30%
Maintains healthy weight
- Joint and back pain -25%
Manages stress
- Cancers (colon and breast) -20%
Improves quality of life

Some is good, more is better
Make a start today: it's never too late
Every minute counts

Be active
at least 150 minutes moderate intensity per week
or a combination of both
at least 75 minutes vigorous intensity per week

Build strength
on at least 2 days a week

to keep muscles, bones and joints strong

Minimise sedentary time
Break up periods of inactivity
For older adults, to reduce the chance of frailty and falls

Improve balance
2 days a week

UK Chief Medical Officers' Physical Activity Guidelines 2020
Importance of sedentary behaviour and light-intensity physical activity

Ekelund et al. bmj. 2019;366:l4570.
Leicester acute sedentary trials (n = 129)
Insulin response to breaking sitting

![Graph showing mean insulin response (mU/L) for white European and South Asian individuals in sitting, standing, and physical activity conditions.](image-url)
Difference in physical activity levels
(Yates et al. 2010, Prev Med)

MET.hr/week

Men

Women

South Asian

White European
Objectively assessed physical activity

Walking pace and life expectancy

Proportion reporting habitual brisk walking
South Asian = 19%
White European = 40%

Zaccardi et al. Mayo Clinic Proceedings 2019; 94: 985-994
South Asian Risk
(Ghouri et al. Diabetologia 2013)

83% of ethnic difference explained by fitness and physical activity

HOMA-IR

Fitness (ml/kg.min)
Over 20% of difference explained by lower levels of physical activity in South Asian groups

Differences in diet

Some evidence that south Asians consume a less healthy diet, including

- Less fruit, vegetables and fibre
- More processed grains (e.g. white rice)
- Higher ratio of $\omega$-6 to $\omega$-3

Data less consistent or clear than for physical activity

A 5-Day High-Fat, High-Calorie Diet Impairs Insulin Sensitivity in Healthy, Young South Asian Men but Not in Caucasian Men

South Asians (SAs) develop type 2 diabetes at a younger age and lower BMI compared with Caucasians (Cs). The underlying cause is still poorly understood but might result from an innate inability to adapt to the Westernized diet. This study aimed to compare the metabolic adaptation to a high-fat, high-calorie (HPHC) diet between both ethnicities. Twelve healthy, young male SAs and 12 matched Cs underwent a two-step hyperinsulinemic-euglycemic clamp with skeletal muscle biopsies and indirect calorimetry before and after a 5-day HPHC diet. Hepatic triglyceride content (HTG) and abdominal fat distribution were assessed using magnetic resonance imaging and spectroscopy. At baseline, SAs had higher insulin clamp levels than Cs, indicating reduced insulin clearance rate. Despite the higher insulin levels, endogenous glucose production was comparable between groups, suggesting lower hepatic insulin sensitivity in SAs. Furthermore, a 5-day HPHC diet decreased the insulin-stimulated (nonoxidative) glucose disposal rate only in SA. In skeletal muscle, no significant differences were found between groups in insulin/mammalian target of rapamycin signaling, metabolic gene expression, and mitochondrial respiratory chain content. Furthermore, no differences in mobilization of HTG and abdominal fat were detected. We conclude that HPHC feeding rapidly induces insulin resistance only in SAs. Thus, distinct adaptation to Western food may partly explain their propensity to develop type 2 diabetes.

Diabetes 2014;63:268-276 | DOI: 10.2337/db13-0936

The incidence of type 2 diabetes is increasing rapidly worldwide, especially in people of South Asian (SA) descent (1). SAs originate from the Indian subcontinent and represent one-fifth of the world's population. Both native and migrant SAs are at high risk of developing type 2 diabetes compared with Caucasians (Cs) (2–4). Not only is the prevalence of type 2 diabetes four to six times higher, but it also occurs at a younger age and lower BMI (5–6). Moreover, the risk of cardiovascular and renal complications is higher (7–10). The underlying cause of this excess risk is still incompletely understood, and only a few in-depth studies have been conducted to
Conclusions Part 2

- South Asian get a greater health benefit for a given improvement in body weight, physical activity or diet
- However, substantial behaviour change is needed to normalise risk
- Low fitness and physical activity explain much of the disease burden in South Asian communities
Can diabetes be prevented in South Asians

Modesti et al. Internal and emergency medicine. 2016 Apr 1;11(3):375-84.
Cultural barriers: Fatalism
(Lawton et al. 2006 Health Education Research)

“God has given me this disease of sugar. Whatever happens, it happens because God wants it to happen”

“With age, as you know, you become weaker, and there is not much you can do about it”
Other barriers
(Horne & Tierney 2012 Preventive Medicine)

• Physical activity seen as exacerbating ill health

• Importance of food with social occasions

• Cultural norms pertaining to gender roles

• Unfamiliar with local geography and lack of culturally sensitive facilities
Enablers

(Horne & Tierney 2012 *Preventive Medicine*)

- Support from family
- Peer-support
Family based prevention programme
NIHR Programme Grant RP-PG-0606-1272

NIHR CLAHRC East Midlands
Translating prevention into routine care

A community based primary prevention programme for type 2 diabetes integrating identification and lifestyle intervention for prevention: the Let’s Prevent Diabetes cluster randomised controlled trial

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DOI: 10.1111/apt.13254

1688 individuals and 54 GP practices recruited
Followed up for 3 years

Average increase of 400 steps/day
Impact of depression on behaviour change

Depression and South Asians

Conclusion Part 3

- Diabetes can be prevented in Black and minority ethnic communities, but has to be tailored to cultural norms and perceptions.

- Impact of depression is likely to be a key factor of importance.
Thank you

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