Editorial

Preventing Type 2 diabetes: making the evidence work for migrant Indian populations

Type 2 diabetes mellitus is a chronic and debilitating disease characterized by an inability to adequately regulate blood glucose levels. The symptoms of type 2 diabetes are associated with a reduced quality of life in the short term, whilst in the longer term the disease may lead to serious complications such as cardiovascular disease, blindness, renal failure and amputation. The prevalence of type 2 diabetes is currently estimated to be around 6 per cent by the International Diabetes Federation, and growing - as such it is now thought to be the fifth leading cause of mortality globally. The enormous public health burden of type 2 diabetes and its associated co-morbidities are a relatively recent phenomenon; indeed type 2 diabetes was a relatively rare condition until the latter half of the 20th century. This rise was closely mirrored by a dramatic increase in industrialized environments where energy dense foods are plentiful and the link between physical activity and food procurement has been broken. Over the past few decades India has provided a good case study of this phenomenon with the rapid expansion of, and migration to, urban centres. India now heads the international league table for the highest number of subjects with type 2 diabetes, a position it is expected to maintain into the future with 80 million individuals estimated to have type 2 diabetes by 2030. The Indian genotype and/or culture seems to be particularly susceptible to type 2 diabetes when exposed to industrialized environments. For example, the prevalence of type 2 diabetes in urban areas has been shown to be up to 5 times higher than rural settings. Data from the Indian Diaspora also tell a revealing story. In the United Kingdom (UK), where Indian migrants and their families now form the largest ethnic minority group, the prevalence of type 2 diabetes has been estimated to be 4 - 6 times higher than that in the general population. The reasons for this are incompletely understood, despite various hypotheses. However, clearly lifestyle factors related to migration are a major causal factor. For example, data from industrialized countries have shown that migrant south Asian communities undertake around half the amount of daily physical activity and have higher levels of central obesity compared to the host white European population. Given these startling figures, strategies and policies aimed at preventing type 2 diabetes in migrant Indian populations are essential and constitute a growing public health priority for India and other countries with large Indian populations.

Randomized controlled trials have consistently shown that lifestyle interventions can be successful at reducing the risk of progressing to type 2 diabetes by 30 to 60 per cent in those identified with a high risk of diabetes. For example, the Indian Diabetes Prevention Programme found that the relative risk of type 2 diabetes was reduced by 29 per cent following a lifestyle intervention and the Diabetes Prevention Program, conducted in a multi-ethnic population in the USA, found that the risk of type 2 diabetes was reduced by 58 per cent in those given lifestyle counselling compared to control conditions over a 3 year period and that the intervention effect was consistent across ethnic/racial groups. These results have also been replicated in Finland, Japan and China. Per protocol analyses of the American and Finnish studies also revealed that the risk of type 2 diabetes was reduced by 90 per cent or more when individuals achieve their
prescribed lifestyle change goals\textsuperscript{15,16}. Given that the global prevalence of type 2 diabetes is attributable to lifestyle factors and that lifestyle modification is at least, if not more, effective than pharmaceutical agents at preventing type 2 diabetes\textsuperscript{12}, lifestyle change should be the primary focus of diabetes prevention initiatives.

However, despite the unequivocal evidence that lifestyle modification is effective in preventing type 2 diabetes, there are several limitations when it comes to translating this evidence into practice. Previous diabetes prevention programmes have involved multiple and intensive one-to-one counselling appointments, an approach that is unlikely to be feasible in a real-world health care setting. Even the Indian Diabetes Prevention Study, which has been widely touted as a pragmatic behaviour change programme, included bi-annual personal counselling sessions and monthly telephone contact\textsuperscript{13}. Although traditional lifestyle counselling programmes have been reported to be cost-effective in the longer term, including in migrant south Asian communities\textsuperscript{17}, these would place a crippling effect on all but the wealthiest nations in the shorter term if rolled out on a national level. We have argued that although intensive diabetes prevention programmes are academically interesting and were necessary to prove the efficacy of lifestyle change, these will have little translational relevance until specifically designed to take into account the infrastructure and resources available to national health care providers and make use of existing strategies that are being utilized for the promotion of self-management in other patient groups\textsuperscript{18}. Thanks to the work of Glasgow and colleagues\textsuperscript{19}, this research - practice “gap” was eloquently elucidated as a general limitation in medicine over a decade ago and their RE-AIM framework was developed as a tool for ensuring research has direct translational relevance to usual health care practice. However, only a limited amount of work has been done to bridge this gap in the prevention of type 2 diabetes.

Recently, several research organizations from different countries have responded to this limitation by replacing traditional lifestyle counselling methods of behaviour change, largely based around one-to-one patient contract, with group-based educational programmes. For example, a recent study in a multi-ethnic population in Leicester, UK, evaluated a pragmatic 3-hour structured education programme aimed at promoting walking activity in those with impaired glucose regulation\textsuperscript{20}. The programme, called the Prediabetes Risk Education and Physical Activity Recommendation and Encouragement (PREPARE), was based on an established approach to promoting self-management that is currently recommended in the UK for all individuals with type 2 diabetes; as such it utilized an approach to promoting behaviour change that was compatible with the current health care infrastructure within our country. Results from a randomized controlled trial\textsuperscript{21} found that when the PREPARE programme incorporated pedometer use it was successful at promoting significant increases in physical activity and decreases in both 2-hour post-challenge glucose and fasting glucose compared to control conditions after 12 months. Indeed despite the programme’s pragmatic nature, the improvements in glucose regulation were comparable to, or greater than, those seen in more resource-intensive diabetes prevention programmes\textsuperscript{21}. The PREPARE programme owed its success to the collaboration of a multi-disciplinary team of experts, including psychologists, clinicians and primary health care policy advisors; it was also developed according to established criteria for designing complex interventions which included a theory, modelling and pilot phase; making the programme reproducible. Given the programme’s success we went on to develop a multi-factor diabetes prevention education programme and tailor it to the language and cultural needs of the large local Indian population using systematic methodology that has been described in detail elsewhere\textsuperscript{22}. In brief, key features of action research involving an iterative process and stakeholder involvement were used. Both qualitative and quantitative research methods were used to refine the development of the curriculum, resources and training programme. The aim was to ensure that the programme was effective at initiating behaviour change as well as meeting the language, literacy and cultural needs of South Asians. The end product was an evidence-based educational programme that met both the needs of the local population and the resource and infrastructure limitations of our national health service. Pending results from a large randomized controlled trial currently being undertaken within a primary health care setting, we are confident that this intervention and others like it will be commissioned by primary health care providers in the future.

Other research groups in industrialized countries, including Finland, Germany Australia and America have also developed and evaluated group-based diabetes prevention education programmes that meet the needs of their respective health care providers\textsuperscript{23-26}. However, if we are to stem the rising tide of diabetes and ensure that effective systematic diabetes prevention initiatives become commonplace at a national level, more work
involving academics, clinicians and policy makers is needed globally. Given the particularly high number of individuals with type 2 diabetes in India and the high risk of diabetes in the large Indian Diaspora, this work will have particular relevance to Indian communities globally.

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**References**