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Type 2 diabetes and cardiovascular disease in South Asians

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ABSTRACT

Type 2 diabetes (T2DM) is growing at a pandemic scale and is associated with a rapid increase in its complications such as cardiovascular diseases (CVD). This problem is even worse in South Asian population with South Asian people having a much higher prevalence of T2DM and CVD, occurring at an earlier age and being associated with premature and high mortality. This review looks in detail at the current knowledge on epidemiology and characteristic pathophysiology of T2DM and CVD (coronary heart disease, heart failure, stroke and peripheral vascular disease) in South Asian migrant population. Specific attention is also drawn to the role of novel risk factors and cultural and socioeconomic factors on occurrence and outcomes of these chronic diseases in this population. Finally the review makes recommendations on various measures including need for further research to tackle this serious health challenge facing the South Asian community.

1. Introduction

South Asians have origins on the Indian sub-continent (India, Pakistan, Bangladesh, Sri Lanka and Nepal) and collectively they form 20% of the world population. Since the Second World War there has been a progressive migration of people from these countries to many countries in Europe and North America. In UK they are the largest ethnic minority group comprising over 4% of the total UK population [1]. Cardiovascular diseases (CVD) (which include coronary heart disease (CHD) and stroke) are of pandemic status with significant mortality and morbidity and consequent economic impact [2,3]. However there is significant ethnic variation in its prevalence with South Asians not only on the sub-continent, but also in diaspora harbouring the highest risk of developing these diseases, with a projection illustrating that in 2020 South Asians will contribute 40% of the global CVD burden [4–7]. Furthermore CVD and type 2 diabetes (T2DM) develop at an earlier age in South Asians and associated complications are seen more commonly compared to white Europeans [6–13]. The reason for this heightened CVD risk in South Asians is not entirely clear but is thought to be mainly related to high prevalence of insulin resistance and related atherogenic risk factors in this population [6,14]. It is also likely that factors associated with urban lifestyle/migration such as high calorie diet and lack of physical activity further enhances the underlying insulin resistance and consequent cardiovascular risk. The problem is further made worse by the paucity of evidence based knowledge and guidelines on primary and secondary prevention of

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CVD specific to this ethnic community [15]. Moreover, factors such as health beliefs, language difficulties, educational level, socioeconomic status and inequalities in access to health care have a further adverse impact on the effective management and outcome of CVD in this population [1]. Not surprisingly, there seems to be a lack of relative decline in CHD and stroke rates in this population compared to Europeans [9], suggesting the inequalities gap is not being as successfully addressed as desired, despite an overall fall in absolute rates in areas such as CHD.

The aim of this article is to review the literature and update the readers on epidemiology, risk factors and pathogenesis of T2DM and CVD in migrant South Asian populations. There have been extensive review articles on CHD and T2DM in South Asian community [16–20]. However with the recent launch of the NHS Health Checks Programme in England [21], the publication of this updated review is timely and pertinent.

2. Type 2 diabetes and CHD in South Asians

2.1. *Epidemiology*

Currently 246 million people worldwide are affected by diabetes and the number is expected to rise to 380 million by 2025. A substantial 80% increase will be seen in middle to low income countries and the highest rise will be seen in Indian sub-continent [3,22]. The prevalence of T2DM in the South Asian population living in the UK is around 20% which is nearly fivefold higher than the indigenous White population. Previous studies have also shown that in up to 40% of cases the disease remains undiagnosed [5,6,23]. Our own studies from Leicester have shown that 4.7% of South Asian had screen detected T2DM compared to 2.8% white Europeans [24]. Furthermore diabetes in South Asians occurs 5–10 years earlier than white Europeans and many have chronic complications of diabetes such as CHD, nephropathy, retinopathy at the time of presentation [6–13]. The epidemiology of diabetes in British South Asians has been recently reviewed by Wild and Chaturvedi who highlighted the paucity of robust epidemiological data on T2DM in British South Asians and therefore a need for large, population based studies to identify the current trends in prevalence of diabetes and proportion of undiagnosed cases in this population [25].

Like diabetes, CHD is also more common in South Asians. Myocardial infarction occurs at a younger age and is associated with premature CHD mortality compared to other populations in rest of the world [6–13]. Furthermore the CHD risk in South Asians differs between men and women and in the ethnic subgroups. According to the 2004 Health Survey For England (HSE) [10], the prevalence of self-reported CHD (doctor diagnosed heart attacks and angina) in people aged 55 years and above was highest in Pakistani men (35.1%) and Indian women (14.7%) and the prevalence of heart attack was highest in Pakistani group (19% men, 6.9% women) [10]. The HSE also found that the prevalence of CHD in UK South Asians has risen between the two surveys of 1999 and 2004. The greatest rise is seen in Pakistani men where the prevalence has almost doubled between these two survey years from 6.3% in 1999 to 12.0% in 2004 [10].

South Asians suffer up to a 50% higher CHD mortality rate compared to indigenous white Europeans in the UK [26,27]. Data from the latest 2001 census of England and Wales on mortality by country of birth have also highlighted the increased CHD mortality in the UK South Asians population. The Standardised Mortality Ratios (SMR) for CHD were high amongst men and women aged over 20 years and born in South Asian countries. The CHD mortality was highest amongst Pakistani men aged between 20 and 44 years of age (over double the expected number of deaths, SMR 261; CI 203–330) [28]. The evidence of increased CHD mortality in this population also comes from a large prospective study – the Southall and Brent study in which CHD risk factors and mortality in 1420 South Asians and 1787 white European men aged between 40 and 69 years at baseline were compared [26]. The age adjusted CHD mortality at median follow-up of 16.2 years, was 60% greater in South Asian compared to White men.

It is emerging that much of this increased prevalence and mortality from CHD in the South Asian population is related to the higher prevalence of T2DM and factors related to insulin resistance in this population [29,30]. On average 20–40% more South Asian patients with myocardial infarction have diabetes at presentation compared to white European patients [31,32]. Furthermore there is some evidence showing that South Asians admitted with myocardial infarction have 50% higher 6-month mortality compared to white Europeans, largely attributed to the higher prevalence of diabetes in South Asian patients [32]. Furthermore South Asian people with diabetes suffer from higher CHD deaths compared to their white European counterparts [8]. In the Southall and Brent study, nearly half of the total CHD deaths in South Asian participants were seen in those with diabetes compared to 16% in white Europeans [8]. In another prospective study of 730 South Asian and 304 White people with diabetes, mortality from CHD was found to be two times higher in younger South Asian participants aged 30–64 years compared to white Europeans. Furthermore the prevalence of CHD in the survivors was 3.8 times higher in South Asian participants compared to white Europeans at 11-year follow-up in this study [6]. In the INTERHEART study, the largest, global case–control study of risk factors for acute myocardial infarction, diabetes was one of the three risk factors particularly associated with premature myocardial infarction (age below 60 years) in the native South Asian patients, the other two factors being a high waist-to-hip ratio and dyslipidaemia [7].

While impaired glucose regulation (IGR) is out of the scope of this review, limited studies have shown that South Asians have a higher rate of IGR and a three times greater risk of progression to T2DM compared to white Europeans in the UK [33,34]. In the ADDITION-Leicester study, IGR was shown to be associated with significant vascular stiffness in the relatively young (mean age 59 years) and overtly healthy multiethnic UK study population, indicating the increased risk of vascular disease associated with IGR in a multiethnic population [35]. In other studies, South Asians with established CHD but without diabetes as per the current diagnostic criteria found to have a higher degree of dysglycaemia [36]. It is speculated that a high prevalence of non-diabetic dysglycaemia or IGR could also be contributing to increased CHD risk in this population [36]. Aarabi and Jackson conducted a systemic review of longitudi-