Abdominal obesity, an independent cardiovascular risk factor in Indian subcontinent: A clinico epidemiological evidence summary

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ABSTRACT

Evidence is emerging that obesity-associated cardiovascular disorders (CVD) show variations across regions and ethnicities. However, it is unclear if there are distinctive patterns of abdominal obesity contributing to an increased CVD risk in South Asians. Also, potential underlying mechanistic pathways of such unique patterns are not comprehensively reported in South Asians. This review sets out to examine both. A comprehensive database search strategy was undertaken, namely, PubMed, Embase and Cochrane Library, applying specific search terms for potentially relevant published literature in English language. Grey literature, including scientific meeting abstracts, expert consultations, text books and government/non-government publications were also retrieved. South Asians have 3-5% higher body fat than whites, at any given body mass index. Additional distinctive features, such as South Asian phenotype, low adipokine production, lower lean body mass, ethno-specific socio-cultural and economic factors, were considered as potential contributors to an early age-onset of obesity-linked CVD risk in South Asians. Proven cost-effective anti-obesity strategies, including the development of ethno-specific clinical risk assessment tools, should be adopted early in the life-course to prevent premature CVD deaths and morbidity in South Asians.

Key words: Abdominal obesity, cardiovascular risk, cardiovascular diseases, diabetes mellitus, South Asians

INTRODUCTION

Increased health risks of obesity have been documented for centuries in *Charaka Samhita*[1] and writings attributed to Hippocrates.[2] Such observations are no less relevant now. Evidence is emerging that obesity-associated illnesses, specifically cardiovascular disorders (CVD) show variations across regions and ethnicities.[3,4] One of the strongest phenomena in support of such observations is the recent redefinition of the body-mass-index (BMI) criteria, to specific populations, for example, the Asia-Pacific criterion for obesity.[5] In this review, distinct patterns in obesity, mainly abdominal obesity, and its associated illnesses are discussed from a South Asian perspective. South Asians comprise individuals who belong to heterogeneous ethnicities and trace their origin from various countries in the Indian subcontinent (India, Pakistan, Nepal Sri Lanka and Bangladesh). There are two main focus areas of this review. First, what are the distinctive features of adult obesity in South Asians compared to Caucasian populations? Such an approach might help identify the uniqueness of clinical patterns of obesity-related illnesses in the South Asians and also help towards better clinical diagnosis and tailored management. Secondly, the underlying mechanistic pathways that contribute to such distinct patterns among the South Asians. This second

Access this article online	
Quick Response Code:	Website: www.jcdronline.com
	DOI: 10.4103/0975-3583.89803

aspect is vital for adopting a strategic approach to prevent and control obesity-related disease burden among the South Asians. In addition, this review discusses related topics, such as the need for new and revised cut-off points of BMI for specific ethnicities, the burden of obesity in specific population sub-groups, and main differences underlying abdominal obesity compared to general obesity.

DEFINITIONS

Obesity, is defined as a body fat content of more than 20% in average adult males and over 30% in females.[6] However, obese individuals vary in the amount of excess fat that they store, the regional distribution of that fat within the body, and the related health consequences differ noticeably amongst these obese persons.[6,7] It is therefore essential to make a distinction between those at augmented risk as a result of abdominal obesity from those with generalized obesity.[8] Even though most epidemiological studies have only used BMI as a predictor of disease, there is substantiation that subjects with abdominal obesity, as assessed by measurement of waist circumference or waist-hip ratio, are at a greater risk of cardio metabolic risk, independently of risk associated with a raised BMI.[9-11] Further, waist circumference beyond 90 cm in males and over 80 cm in females is an effectual clinical predictor of the metabolic risk like other clinical, biochemical and imaging variables.[5,12] Such clinico-epidemiological observations are clearly important to redefine the occurrence of obesity-associated cardiovascular risks in a population where both obesity and CVD are recent phenomena. South Asians, in particular, have shown a different pattern of cardiovascular risks, both, in indigenous populations, and also those who migrated to the West.[13,14]

MATERIALS AND METHODS

This review attempts a comprehensive database search strategy more akin to a systematic review approach; however, falls short of the scientific rigor involved in a systematic review. Nevertheless, the evidence drawn should add to the existing body of literature showing similar observations and conclusions.[14] We abstracted the most significant published literature on the electronic databases, namely, Pub Med, Embase and the Cochrane Library applying specific search terms such as "South Asians";" Asian Indians"; "obesity"; "overweight"; "cardiovascular risk factors"; "childhood obesity"; cardiovascular disorders - "CVD"; Coronary heart disease - "CHD"; "physical inactivity"; "metabolic syndrome"; "ethnicity" etc. We have also gone through articles unpublished on Pub Med; abstracts of conference/meetings; consulting authors/experts in the field; text books; and, publications of governmental/non-governmental organization. Articles only in English language were considered.

Globalization, epidemiological transition and obesity

Recent data of mounting burden of noncommunicable diseases synchronizing with globalization can be understood in the context of epidemiological, nutritional, demographic and socioeconomic transition across the globe.[15-17] It has been hypothesized that obesity and type-2 diabetes had their lineage in a natural choice of early humans, favoring a "thrifty genotype",[18] which enabled very well-organized storage of energy during periods of food abundance. Similarly, the 'thrifty phenotype'[19] explains how low-birth-weight babies, who have been exposed to a chronic energy-deprived state, accumulate energy stores and go on to develop type-2 diabetes in adulthood. These genetic or phenotypic adaptations that were supportive in times of famine, have become detrimental with increasing nutritional availability and decreasing physical activity due to modern lifestyle [Figure 1].

Overweight and obesity in South Asians

Though South Asians have a very high prevalence of abdominal obesity, there is paucity of country wide accurate data and statistics related to this..[20-22] Obesity in childhood and adolescence is attaining an alarming and epidemic proportion in India with about 15–20% of the population being affected.[23] Similarly, about 30-65% of adult urban Indians are either overweight, obese or have abdominal obesity.[24] Though the prevalence of obesity in South Asians is lower than whites, blacks and Hispanics, the health risks related with obesity crop up at a lower BMI in South Asians.[25,26] These observations put

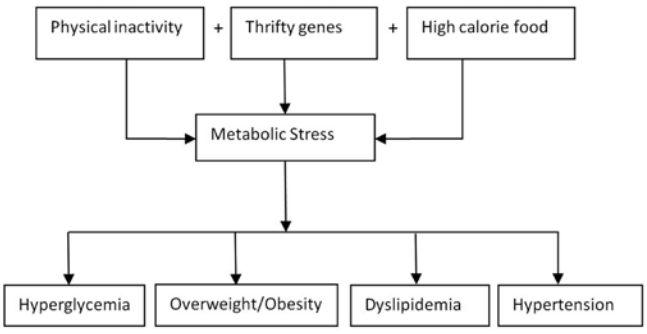

Figure 1: Thrifty genotype and epidemiological transition, modern lifestyle-metabolic stress with thrifty genes