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ORIGINAL ARTICLE

Importance of anthropometry in assessing insulin resistance as a pre-alarming sign before the onset of metabolic syndrome: a study among apparently healthy subjects

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Abstract Insulin resistance (IR) and obesity are inter-related causes of metabolic syndrome. Early identification before the onset of metabolic syndrome will be useful to lead a healthy life. The purpose of the present study was to identify the importance of IR before the onset of metabolic syndrome in apparently healthy, non-diabetics subjects. Data of 227 apparently healthy non-diabetics (20-70 years) who reside in a suburban area in Colombo district, Sri Lanka, were recruited for this study. Fasting blood glucose (FBG), fasting serum insulin (FSI), weight, height, waist circumference (WC), hip circumference (HC), and mid-upper arm circumference (MUAC) were measured and homeostatic model assessment for insulin resistance (HOMA-IR) was calculated. Body mass index (BMI), waist-to-hip ratio (WHR), and waist-to-height ratio (WHtR) were calculated. Data were analyzed using Statistical Package for Social Science (ver.17). Majority were females (61.8 %). Prevalence of IR was 59.9 %. Mean BMI of IR subjects was 28.3 ± 2.7 kg m^{-2} where 75.3 % of obese had IR. All anthropometric variables except height had significant positive correlations ($P<0.01$) with IR. Linear regression analysis indicated that BMI is useful in predicting IR while logistic regression analysis showed that BMI and WC are the best predictors of IR in males whereas it was WHtR and WC in females. Even though study subjects were apparently healthy and not diagnosed as diabetes, those with elevated anthropometric parameters had higher prevalence of IR. Best anthropometric predictors of IR for a specific sex should be used as an easy self-monitoring alarming sign before the onset of metabolic syndrome.

Keywords Insulin resistance · Body mass index · Waist circumference · Apparently healthy · Waist-to-height ratio · Waist-to-hip ratio

Introduction

Insulin resistance (IR) is a state in which normal amounts of serum insulin are not adequate to produce the expected biologic response in target tissues like adipocytes, muscle, and liver [1]. IR is a characteristic feature of type 2 diabetes (T2D) which is mainly linked with metabolic syndrome (MS). IR is considered as one of the major causative factors for MS, a cluster of metabolic abnormalities including diabetes, high blood pressure, and high cholesterol levels along with obesity. Over the past two decades, worldwide prevalence of MS has increased significantly. Approximately 20–25 % of the worlds' adult population accounts for MS, and they are prone to fivefold greater risk of developing T2D [2]. It is estimated that around 90–95 % of diabetes worldwide are diagnosed as T2D with IR. Furthermore, prevalence of MS among South Asians is estimated to be 20–25 %, and early onset of T2D and cardiovascular diseases (CVD) is common among Asians [3]. In 2005, the prevalence of T2D among Sri Lankans was approximately 11 % and one fifth of adults were found to be dysglycemic [4]. Obesity, as one of the major components of MS, has reached epidemic proportions during the last three

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