

The Relation of the Non-modifiable (Destiny) and Modifiable (Free Will) Factors in Metabolic Derangements

A risk factor is any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury. Identifying risk factors has been the cornerstone in prevention of chronic diseases. One of the key aspects of this is to identify the risk factor as early as possible so that the remedial measures can be taken early and the ailment prevented. The search for the early identification of risk factors had taken us to measures directed to optimising maternal health to optimising health in pregnancy and conscious attempts postnatally, like following diet regimens and exercise protocols all directed to prevent certain health ailments.^[1]

These risk factors have been traditionally classified as those which are non-modifiable and the ones which are modifiable. The non-modifiable ones are the ones which are a destiny like genetic makeup of an individual or the age and sex of the individual. The modifiable ones have been labelled as the ones which can be addressed by some changes like obesity and sedentary lifestyle. However, this distinction is blurred as we all know that a modifiable factor like obesity also is modulated by genetic makeup (which is non-modifiable).^[2]

Most cardiovascular risk assessment tools have included demographic factors like age, sex as well as other factors like presence of diabetes, hypertension and dyslipidaemia. These risk assessment tools have ignored anthropometric variables. Anthropometric variables, however, have been used time and again as risk predictors for cardiovascular risk. The most important being body mass index (BMI), waist circumference (WC) and waist-hip ratio (WHR). The latter two have been the components of metabolic syndrome (MetS). Measurement of WHR is more useful than BMI or WC in the identification of individuals estimated to be at increased risk for future primary cardiovascular events as concluded by Chen *et al.* from the Ausdiab data. The measurement of WC and WHR, however, needs well-calibrated tools, can be socially unacceptable and sometimes may not be possible in clinic setting. Neck circumference (NC), however, represents a tool that is easy to measure, constant and reliable in clinic settings. It has also been shown as a tool associated with central obesity, hypertension and other components of MetS and correlates with WC and WHR. Also these variables have not been well studied in children and adolescents. This also represents one population where data on measures of central obesity are not well standardised.^[3,4]

Most anthropometric variables pertaining to metabolic risk are influenced by exogenous lifestyle-related factors including NC, WC and WHR and so their predictability may be better in adults when the metabolic features

evolve. However an anthropometric variable 2D:4D ratio [also referred as digit ratio (DR)] which is related mainly to antenatal sex steroid exposure. DR has been correlated with sexual orientation, genital cancers, psychological disorders, physical and competitive behaviour and personality traits. Thus DR is a variable that is at least partly determined by destiny (non-modifiable) of the individual.^[5]

Testosterone deficiency has been associated with heart disease, obesity, MetS, and weight loss reported to increase testosterone levels. DR which correlates with low testosterone level should positively correlate with obesity and cardiovascular risk factors. In a very interesting article in the present issue of the journal authors have correlated DR (a non-modifiable anthropometric variable determined by destiny) with NC (mainly influenced by exogenous or modifiable factors the free will). They have found an interesting negative correlation in DR and NC in normal BMI range but the correlation was not significant beyond normal BMI range population. A wider study with increased numbers may further clarify this interesting correlation.^[6]

Time and again anthropometric variables have been involved in defining MetS and predicting cardiovascular risk. Previously used variables like BMI, WC, WHR and NC are mainly studied in adults and evolve after evolution of obesity or central obesity in a person. An interesting article by White *et al.* correlated DR with components of MetS in adults. And the article in current issue correlates DR with NC. DR as a marker can be used prior to evolution of central obesity to predict same which becomes unique aspect of this variable. It is also a marker which is easy to measure and practical in clinic setting and so a more felt need for validation of markers like DR and NC.^[7]

The earliest anthropometric measures to estimate cardiovascular risk evolved from BMI to WC and WHR as the latter predicted central obesity which is supposed to be more detrimental. NC was looked upon as it correlated with WC and WHR and was less cumbersome, more reproducible and easy to use in office practice. DR goes a step ahead as it is determined by prenatal factors (destiny) and has a possible correlation with other markers like NC which evolve over time partly due to exogenous influences (free will). If larger studies give more insights, DR has the potential to become an early identifiable, suitable for office practice anthropometric measure of metabolic risk.

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