Correlation between Neck Circumference and Other Anthropometric Indices as a Predictor of Obesity

Authors : Madhur Verma, Meena Rajput, Kamal Kishore

Abstract : Background: The general view that obesity is a problem of prosperous Western countries has been repealed with substantial evidence showing that middle-income countries like India are now at the heart of a fat explosion. Neck circumference has evolved as a promising index to measure obesity, because of the convenience of its use, even in culture sensitive population. Objectives: To determine whether neck circumference (NC) was associated with overweight and obesity and contributed to the prediction like other classical anthropometric indices. Methodology: Cross-sectional study consisting of 1080 adults (> 19 years) selected through Multi-stage random sampling between August 2013 and September 2014 using the pretested semi-structured questionnaire. After recruitment, the demographic and anthropometric parameters [BMI, Waist & Hip Circumference (WC, HC), Waist to hip ratio (WHR), waist to height ratio (WHtR), body fat percentage (BF %), neck circumference (NC)] were recorded & calculated as per standard procedures. Analysis was done using appropriate statistical tests. (SPSS, version 21.) Results: Mean age of study participants was $44.55+15.65$ years. Overall prevalence of overweight & obesity as per modified criteria for Asian Indians (BMI $\geq$ 23 kg/m2) was 49.62% (Females-51.48%; Males-47.77%). Also, number of participants having high WHR, WHtR, BF%, WC & NC was 827(76.57%), 530(49.07%), 513(47.5%), 537(49.72%) & 376(34.81%) respectively. Variation of NC, BMI & BF% with age was non- significant. In both the genders, as per the Pearson's correlational analysis, neck circumference was positively correlated with BMI (men, $r=0.670$ {$p < 0.05$}; women, $r=0.564$ {$p < 0.05$}), BF% (men, $r=0.407$ {$p < 0.05$}; women, $r= 0.283$ {$p < 0.05$}), WC (men, $r=0.598${$p < 0.05$}; women, $r=0.615$ {$p < 0.05$}), HC (men, $r=0.512${$p < 0.05$}; women, $r=0.523${$p < 0.05$}), WHR (men, $r= 0.380${$p > 0.05$}; women, $r=0.022${$p > 0.05$}) & WHtR (men, $r=0.318$ {$p < 0.05$}; women, $r=0.396${$p < 0.05$}). On ROC analysis, NC showed good discriminatory power to identify obesity with AUC (AUC for males: 0.822 & females: 0.873; p- value < 0.001) with maximum sensitivity and specificity at a cut-off value of 36.55 cms for males & 34.05cms for females. Conclusion: NC has fair validity as a community-based screener for overweight and obese individuals in the study context and has also correlated well with other classical indices.

Keywords : neck circumference, obesity, anthropometric indices, body fat percentage