Statistical clustering of maxillary dental arches

Abstract:

The purpose of this study was to define a procedure for grouping Malaysian dental arches into clusters by applying the agglomerative hierarchical clustering (AHC) method. Standardized digital images of maxillary dental casts of 170 subjects were used to measure the distance joining left and right hamular notches, a, and the perpendicular distance between this line and the incisive papilla, b. Coefficients of the fitted quadratic curve (a 2, a 1 and,a 0) were calculated using selected landmarks on the casts. The variables a, b, a 2, a 1 and,a 0 were then used to represent the shape of each dental cast. Subsequently, casts were randomly divided into 2 subsamples; control and test samples. The AHC method was applied to the control sample to establish clusters. To verify the clusters formed, 40 test samples were assigned to the clusters. The number of acceptable clusters was established when no cluster had less than 4 members (10% of the test samples). The total number of members in all formed clusters was at least 36 (90% of the test samples) and the margin of error, h was 5 mm (least acceptable value). Using the AHC method, maxillary dental arches may be grouped into 3 clusters as defined by the median values of the proposed shape parameters investigated; (46.88 mm, 47.83 mm, 5.12, 0.55,-57.20), (47.31 mm, 43.21 mm, 4.89, 0.11, -53.52) and (51.51 mm, 50.09 mm, 4.85, 0.05, -60.74) respectively.