Abstract

The assessment of the development of skeletal maturation is an essential diagnostic tool in many pediatric disciplines, especially in pediatric endocrinology. The most accurate method of estimating bone age (KV) is a method of Tanner-Whitehouse 3 (TW3), which separately evaluates compartments RUS and CARP, the ossification is controlled by different hormonal axes. While the file type of long bones (metacarpals, phalanges of fingers and distal epiphysis of the radius and ulna – system RUS) is under the dominant influence of somatotropic axis, in the regulation of the development of carpal bones (system CARP) dominates the influence of thyroid axis. The proportionality developmental retardation of the two compartments from the chronological age can directly show the suspected endocrine cause of growth and developmental disorder.

The study included 48 patients with subclinical form of hypothyroidism or in eufunctional status and a reference group of 65 patients with idiopathic growth hormone deficiency and 53 children with constitutional delay of growth and development. All patients were from pediatric ambulances of the Institute of Endocrinology in Prague, ranging in age from 4–18 years. Differences were observed in the value of KV RUS/CARP, height and chronological age and midparental and TW3 prediction of final height. The influence of factors of gender and diagnosis was tested by ANOVA model on the monitored parameters. The effect of diagnosis was confirmed, sex differences did not show statistical significance. A predictive model of suspected hypothyroidism was constructed by the method of multivariate regression with dimensionality reduction and verified its validity auxological data of 15 patients.

Model LR was statistically highly significant (χ^2=19,4, p<0,0001), but explained only 9,85 % of variability of the dependent variable. The sensitivity of the model was very low, i.e. 0,271 (0,166, 0,410), but the specificity was very high, i.e. 0,966 (0,916, 0,987). ROC curve was also applied to estimate the optimum of the cut-off value. It showed medium efficiency differentiation between subjects with and without suspected hypothyroidism, which corresponded to the value of the area under the curve (AUC) 0,660 (0,537, 0,756). In testing the validity of the model was determined 20% success rate in the detection of hypothyroidism and 60% of its diagnosis in this capture. This confirms the low sensitivity but relatively good diagnostic specificity created predictive model .

Key words: skeletal age, TW3 method, hypothyreosis, diagnostic predictive model