Prediction of the hypertension risk in teenagers.

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Objectives: Creation of a hypertension risk stratification model and development of an algorithm to detect hypertension in teenagers.
Methods: The study group consisted of 690 middle and high school students, aged 15-17 years, from the metropolitan area of Warsaw, Poland.
Information concerning family history and presence of risk factors for cardiovascular disease was gathered.
Three-time blood pressure measurements were taken during at least two separate visits, at least a week apart, using the auscultatory method according to standard procedures. Anthropometric measurements included: body weight, height, arm, hip and abdominal circumference. On the basis of taken measurements: body mass index-BMI, Waist to Hip Ratio-WHR, Waist to Height Ratio-WHtR, Hip to Height Ratio were determined. Skin-fold thickness was measured on the rear surface of arm, below the inferior angle of the scapula, and at the belly.

Results: A logistic regression model describing the risk of hypertension in adolescents aged 15-17 has been invented. The formula has been created, allowing the pre-selection of adolescents at risk of hypertension during screening:

\[
\hat{\pi}(x) = \frac{e^{\hat{g}(x)}}{1 + e^{\hat{g}(x)}}
\]

where: \( g(x) = -0.09711\text{height} + 0.08487\text{weight} + 7.76428\text{WHR} + 1.31222\text{family_hypertens=yes} \)

Based on the created risk model an algorithm for the detection of hypertension for practical use has been proposed:

1. Information campaign at schools. 2. Completion of website form using the developed model to estimate a risk of hypertension. 3. In the case of estimated risk >50% - three-time blood pressure measurements at weekly intervals should be taken. 4. If the arithmetic mean of the second and third measurement is between 90 and 95 percentile, non-pharmacological treatment and periodic blood pressure controls are recommended. 5. If it is >95th percentile, further specialized diagnostics is recommended. 6. If the risk is >75% - further evaluation and periodic check up are recommended even if blood pressure values are normal.

Conclusions: The body weight, WHR and incidence of hypertension in the family are the strongest predictors of hypertension in teenagers.

The proposed screening algorithm can be a useful tool for selecting teenagers at risk of hypertension and in need of specialized diagnostics.