

PREDICTION OF ADULT BLOOD PRESSURE IN CHILDHOOD: OPPRTUNITIES FOR EARLY RISK ASSESSMENT.

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Background:

Elevated blood pressure (BP) in childhood is linked to elevated BP in adulthood. Nevertheless, childhood BP is not routinely assessed and there have been few attempts to create paediatric models to predict the risk of adult elevated BP. Prediction of BP trajectory in childhood may help to identify high risk individuals that may benefit most from early intervention.

Methods: The baseline cohort of the Childhood Determinants of Adult Health Study (CDAH) consisted of 8498 participants aged 7-15 years in 1985 with a follow-up conducted in 2004-06. BP was measured in those aged 9, 12 and 15 years at baseline (N=2698) and participants with measurements at both time points were included in these analyses (N=798). BP was categorized as normal or elevated (prehypertensive or hypertensive) using the National High Blood Pressure Education Program (NHBPEP) guidelines in childhood and Eighth Joint National Committee (JNC8) guidelines in adulthood. Mean arterial pressure (MAP), Pulse pressure (PP) and mid-blood pressure (mid-BP) were calculated using the measured systolic blood pressure (SBP) and diastolic blood pressure (DBP) values. Baseline measurements of body mass index (BMI), physical activity, alcohol consumption and smoking status were collected. Multiple linear regression was used to construct a model to predict adult BP values with 95% confidence intervals (CI). Logistic regression was used to predict dichotomous BP outcomes; elevated adult BP and normal adult BP.

Results/Outcomes: Linear regression models including sex, baseline age and baseline SBP predicted adult SBP with the highest accuracy. SBP had the highest discrimination (AUC 0.803) in the logistic regression models, however this was not significantly different to models including MAP and mid-BP (Δ AUC $P>0.05$). Using the SBP model predicted probabilities of adult elevated BP with 95% CI's were tabulated stratified by sex, baseline height and BP. The predicted probabilities were incorporated into a risk assessment tool for predicting risk of elevated BP in adulthood. For example; the probability of elevated BP in a male with a height of 155-170cm and SBP 115-130mmHg was 73.2% (95%CI=71.3-75.1%). Risk of elevated BP in adulthood was lower for all females (<40%) and higher for all males (>40%). Cubic spline interpolation was used to impute probabilities for unknown combinations of height and SBP, however only within the minimum and maximum limits of the existing data, and thus the risk assessment charts remain incomplete.

Conclusions: This study observed that childhood BP, sex, and age or height can be used to assess the risk of elevated BP in adulthood. However, the precision of these estimates is variable and further research is required to determine the of childhood BP risk assessment for early intervention to prevent adult elevated BP.

References:

1. Chen X, Wang Y. Tracking of blood pressure from childhood to adulthood: a systematic review and meta-regression analysis. *Circulation* 2008;117(25):3171-80.
2. Carrico RJ, Sun SS, Sima AP, et al. The predictive value of childhood blood pressure values for adult elevated blood pressure. *Open J Pediatr* 2013; 3(2): 116-26.