



Reconsideration of mid-parental height calculation

Abdullah Bereket, İbrahim Sinan Buğur, Tülay Güran, Zeynep Atay, Azad Akbarzade, Ziya Gurbanov, Ece Öge, Çektar Seyid Rıza Taş, Serap Turan, Andrzej Furman

Department of Pediatric Endocrinology and Diabetes, Marmara University, School of Medicine, Istanbul, Turkey

Background:

Estimation of the child's genetic height potential (target height) is an important tool in evaluating growth disorders. Midparental height (MPH) calculated as $(\text{Mothers height} + \text{Fathers height}) / 2 \pm 6.5 \text{ cm}$, used for this purpose, represents the child's expected height based on parental heights.

Objective and hypotheses:

To evaluate the classical MPH calculations for our population and to explore the optimal MPH model using different mathematical models.

Method:

Height measurements of 988 young adults and their both parents were taken.

Results:

- ✧ The average heights were $164.46 \pm 6.2 \text{ cm}$ in girls and $177.1 \pm 6.8 \text{ cm}$ in boys.
- ✧ On average, girls were 3.1 cm, taller than their mothers and boys were 3.4 cm taller than their fathers.
- ✧ Compared to their calculated MPH, offspring's actual heights were taller ($3.8 \pm 5.7 \text{ cm}$ in males and 2.7 ± 6.4 in females).
- ✧ Correlation of actual height with MPH was slightly stronger in females than males ($r: 0.537$ vs 0.487 , $p < 0.01$).
- ✧ Actual heights of females showed stronger correlation with their mother than their father ($r: 0.486$ vs $r: 0.373$), whereas in males, these were almost equal ($r: 0.400$ vs $r: 0.404$).
- ✧ Subgroup analyses demonstrated that in short ($\text{HtSDS} < -1$) subjects, height was significantly correlated only with maternal height in both genders.
- ✧ In tall ($\text{HtSDS} > 1$) subjects, males' heights correlated better with paternal height while in females this was similar for both parents.
- ✧ When there was a big difference ($> 2\text{SDS}$) between parental heights, offspring's height correlated better with maternal height than paternal height in both genders ($r: 0.437$ vs $r: 0.196$ in females, $r: 0.479$ vs 0.064 in males).
- ✧ Based on our data, multilinear regression models were tested to find the best model to estimate the height of the offspring using the parents' heights yielded the formula below as the best model to make the closest estimations.
- ✧ **Height SDS: $A \times \text{Mothers height SDS} + B \times \text{Fathers height SDS} + C$**
A: Mother's coefficient (0.364), B: Father's coefficient (0.247) C: Intercept (0.421)

Table. Correlations between height in different group of patients with parental heights and midparental height

	All Females	All Males	Short females	Short males	Tall females	Tall males	Parents discrepant for height	
							Height of Female offspring	Height of Male offspring
MPH	0.537	0.487	0.279	0.175	0.322	0.249	0.470	0.417
Maternal height	0.486	0.373	0.315	0.395	0.256	0.117	0.437	0.479
Paternal height	0.400	0.404	0.089	0.114	0.245	0.276	0.196	0.064

Conclusion:

Classical MPH calculation explains only 25% variance in the offspring's height and this becomes less when the offspring is short, tall or when parental height difference is large. Modifications of MPH calculation using multilinear regression model improves accuracy to some extent.

