

## Central and Peripheral Systolic Blood Pressure in Healthy Children and Adolescents and in Patients with Juvenile Hypertension

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**Basics:** The peripheral systolic blood pressure (SBP<sub>brach</sub>) is normally higher than the central systolic blood pressure (SBP<sub>ao</sub>) due to the pulse pressure amplification. The arterial stiffness increases with the normal aging of the aorta. Its consequence is the early wave reflection and increased SBP<sub>ao</sub>. Recent studies proved that SBP<sub>ao</sub> more strongly relates to cardiovascular events than SBP<sub>brach</sub> does in adult patients. We missed data about physiological changes of SBP<sub>ao</sub> in healthy children and adolescents.

**Aims:** 1. To assess the physiological changes of SBP<sub>ao</sub> and SBP<sub>brach</sub> in healthy children and adolescents. 2. To determine the relationship between SBP<sub>ao</sub> and SBP<sub>brach</sub> in patients with juvenile hypertension (JH) and compare it with control groups.

**Methods:** SBP<sub>ao</sub> and SBP<sub>brach</sub> were measured simultaneously by a new non-invasive occlusive oscillometric method (Arteriograph, TensioMed Ltd., Hungary) in a healthy population aged 3-18 years with normal BMI (1802 boys, 1572 girls). The diagnosis of JH based on ECG, echocardiography, abdominal sonography, blood-chemical examination, 24-hour-ABPM and arteriography. SBP<sub>ao</sub> and SBP<sub>brach</sub> were measured in JH patients (173 boys, 44 girls) and compared with sex- and age matched control groups. Results were analyzed by Student's t-test.

**Results:** The physiological changes of SBP<sub>ao</sub> and SBP<sub>brach</sub> measured in healthy population are shown in Table 1. and 2. The SBP<sub>brach</sub> increased with age in both genders. The SBP<sub>ao</sub> was remarkably lower in both genders, and the increasing with age was smaller. The SBP<sub>brach</sub> was 147.8±12.1 mmHg in JH boys and 121.7±8.8 mmHg in controls (p<0.001), while 147.3±15.0 mmHg in JH girls and 117.9±6.9 mmHg in controls (p<0.001). The SBP<sub>ao</sub> was significantly lower in all groups than SBP<sub>brach</sub> was: 127.4±10.4 mmHg in JH boys, 106.1±7.3 mmHg in control group (p<0.001), 129.4±14.4 mmHg in JH girls, 104.6±6.4 mmHg in control groups (p<0.001).

**Conclusions:** First we described the relationship between the SBP<sub>ao</sub> and SBP<sub>brach</sub> measured simultaneously in such a huge healthy population aged 3-18 years. In patients with JH SBP<sub>ao</sub> was considerably lower than SBP<sub>brach</sub> was. On the basis of our findings we may conclude, that the indication of the antihypertensive therapy in JH may be reconsidered, and at least the SBP<sub>ao</sub> should be taken into account.

Table 1.

| Boys     |     |                       |                    |
|----------|-----|-----------------------|--------------------|
| Age (ys) | n   | SBPbrach (mmHg) ± 2SD | SBPao (mmHg) ± 2SD |
| 3        | 44  | 103.0 ± 5.5           | 96.8 ± 7.1         |
| 4        | 53  | 104.1 ± 7.8           | 95.5 ± 8.3         |
| 5        | 80  | 106.4 ± 7.2           | 97.7 ± 7.8         |
| 6        | 120 | 104.5 ± 6.8           | 95.3 ± 6.9         |
| 7        | 85  | 107.8 ± 7.2           | 98.2 ± 8.1         |
| 8        | 74  | 107.0 ± 7.1           | 96.5 ± 7.3         |
| 9        | 92  | 109.3 ± 6.9           | 98.8 ± 7.8         |
| 10       | 81  | 111.2 ± 7.3           | 99.9 ± 7.5         |
| 11       | 80  | 111.5 ± 7.5           | 100.3 ± 7.0        |
| 12       | 101 | 115.0 ± 7.5           | 101.9 ± 6.8        |
| 13       | 169 | 117.2 ± 7.8           | 102.5 ± 6.7        |
| 14       | 187 | 119.5 ± 7.4           | 104.0 ± 6.8        |
| 15       | 171 | 121.1 ± 8.0           | 105.3 ± 7.1        |
| 16       | 162 | 124.5 ± 8.5           | 107.8 ± 7.2        |
| 17       | 197 | 126.3 ± 8.6           | 109.1 ± 7.4        |
| 18       | 106 | 128.2 ± 8.3           | 110.1 ± 7.3        |

Table 2.

| Girls    |     |                       |                    |
|----------|-----|-----------------------|--------------------|
| Age (ys) | n   | SBPbrach (mmHg) ± 2SD | SBPao (mmHg) ± 2SD |
| 3        | 35  | 102.5 ± 5.1           | 97.5 ± 7.8         |
| 4        | 43  | 103.3 ± 5.2           | 96.9 ± 6.9         |
| 5        | 44  | 103.7 ± 6.3           | 96.0 ± 7.9         |
| 6        | 68  | 105.0 ± 6.9           | 96.3 ± 7.3         |
| 7        | 72  | 106.4 ± 7.3           | 97.1 ± 7.1         |
| 8        | 39  | 107.6 ± 7.3           | 97.6 ± 7.5         |
| 9        | 64  | 109.6 ± 6.4           | 98.3 ± 5.8         |
| 10       | 63  | 111.1 ± 7.3           | 100.0 ± 6.5        |
| 11       | 49  | 112.1 ± 6.8           | 99.9 ± 6.7         |
| 12       | 85  | 113.5 ± 7.5           | 101.3 ± 6.4        |
| 13       | 195 | 115.1 ± 7.7           | 101.7 ± 6.9        |
| 14       | 189 | 117.6 ± 8.2           | 103.7 ± 7.6        |
| 15       | 181 | 117.2 ± 7.6           | 104.0 ± 6.9        |
| 16       | 174 | 117.8 ± 7.4           | 104.8 ± 6.8        |
| 17       | 175 | 117.7 ± 8.0           | 104.2 ± 7.7        |
| 18       | 96  | 118.8 ± 8.6           | 105.0 ± 7.5        |