

Influence of physical activity and selected perinatal factors on the occurrence of hypertension in children aged 3-15.

Background

Due to the increasing prevalence of hypertension in the world, prevention has become an important public health initiative. One of the objectives of preventive cardiology is to detect risk factors for cardiovascular diseases in children. Children are the most flexible group, which most readily adopts to beneficial changes, therefore principles of healthy living should be introduced as early as possible. Epidemiological data indicate that physical activity is commonly recommended as an important, modifiable lifestyle component that may help to reduce the risk of hypertension. It is still unclear to what extent such factors as volume, intensity, and duration of activity, as well as sedentary lifestyle, regardless of the level of physical activity, play a role in the development of hypertension. Detailed recommendations for activity levels are needed, especially with regard to the sex and specific age groups, most importantly children who may be at increased risk of developing hypertension due to perinatal factors. Understanding these relationships will enable early preventive intervention.

Aim of the study.

Assessment of the influence of physical activity and selected perinatal factors on the occurrence of hypertension in children aged 3-15.

Material and method.

The study involved 1002 children aged 4-15 (52.6% boys and 47.4% girls). They were examined for body height and weight, and body mass composition, as well as blood pressure; the latter measurement was performed using oscillometric method. Information on perinatal factors (weight and length at birth, duration of gestation, type of labour, maternal age at birth, weight gain in pregnancy) was retrieved from the children's Red Books. Physical activity was assessed with the Actigraph Accelerometer atGT3X-BT; the recording continued for seven consecutive days. The analysis took into account the children who presented at least 500 minutes of time measured in a minimum of 3 weekdays and 1 weekend day. The data were used to assess the number of steps per day, total PA, light PA, moderate-to-vigorous PA, energy expenditure and sedentary behaviour.

Results.

The frequency of systolic blood pressure in the study population was found at the level ≥ 95 centile in 8% of the children (8% of the girls and 8% of the boys), while diastolic blood pressure at the level ≥ 95 centile was found in 14% of the children (16% of the girls, 13.3% of the boys). The findings showed no hypertension related effect of birth weight ($p = 0.257$) and birth length ($p = 0.066$). Caesarean section was found to correlate with elevated blood pressure (43.5% vs. 38.8). Hypertension was more common in naturally-born children (23.5% vs. 20%). No statistically significant association was found between hypertension and preterm birth. The mother's age does not affect the probability of elevated blood pressure. Increased gestational weight gain (GWG) may be associated with higher blood pressure values in the offspring ($p=0.061$). The mean daily MVPA in the children with hypertension amounted to 62.7 minutes. In the group aged 7-11, hypertension was found in 18.7% of the children with 60 minutes of MVPA per day and in 25% of those with less physical activity. Children with hypertension tend to take fewer steps during the day compared to children with normal blood pressure; in the 7-11 age group 8,800 vs. 9,600 steps / day ($p=0.006$), in the 12-15 age group 8,200 vs. 9,400 ($p=0.01$). Hypertension occurs in 11.1% of the children meeting the standard of 11,500 steps per day, and in 22% of the children taking fewer than 11,500 steps per day ($p=0.0006$). The children with hypertension present much lower energy expenditure compared to the children with normal blood pressure, except for the 12-15 age group where energy expenditure is higher than in the healthy children.

Conclusions.

1. The frequency of systolic blood pressure in the study population was found at the level ≥ 95 centile in 8% of the children (8% of the girls and 8% of the boys), while diastolic blood pressure at the level ≥ 95 centile was found in 14% of the children (16% of the girls, 13.3% of the boys).
 - Children with hypertension show lower level of muscle mass compared to healthy children.
2. Physical activity and hypertension in children.
 - Children and adolescents with hypertension show lower levels of physical activity compared to healthy children.

- There is a significantly lower risk of hypertension in children taking 11,500 steps per day.
- Energy expenditure in 12-15 year old children with hypertension and obesity, despite lower physical activity, is higher compared to their healthy peers. In other age groups energy expenditure in children with hypertension is lower compared to healthy children, which is associated with less physical activity.
- Longer duration of the children's involvement in MVPA is associated with lower blood pressure, regardless of the duration of sedentary activities.

3. Selected perinatal factors and hypertension in children.

- The prevalence of hypertension in children with birth weight appropriate for gestational age (AGA) decreases with age.
- Birth length may be a potential risk factor for hypertension in children and adolescents.
- Caesarean section increases the risk of elevated blood pressure in childhood.
- Premature birth is not a risk factor for hypertension in childhood.
- Maternal age at childbirth does not affect the occurrence of hypertension in childhood.
- Gestational weight gain may be a potential risk factor for hypertension in a child.

Key words: blood pressure, hypertension, physical activity, perinatal factors.