THE IMPACT OF BIRTH WEIGHT AND GESTATIONAL AGE ON THE MANAGEMENT OF JUVENILE ESSENTIAL HYPERTENSION

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Abstract: Essential hypertension in children is a very important biological aspect in child pathology, caused by the synergic action of multiple risk factors, with an increasing prevalence. Since there is not much knowledge about juvenile essential hypertension in childhood, in this paper we will clarify the existing data about this pathology and its management, mainly by referring to the correlations during different stages. We found significant correlations between hypertension and the individual values of birth weight and gestational age, which suggest that there is an important relationship between birth weight and gestational age, as important biological markers vs. the different stages of essential hypertension.

Key words: biomarkers; birth weight; gestational age; juvenile hypertension.

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INTRODUCTION

Essential hypertension (EH) in children is a distinct pathology with increasing prevalence nowadays. This is due to the synergic action of multiple risk factors involved. It is generally accepted that high blood pressure (HBP) represents the major cause of cardiovascular diseases (World Health Organization, 2002). The prevalence and rate of diagnosis of HBP in children appear to be on the rise, mainly due to infantile obesity (Sorof et al., 2004; Mohan et al., 2004). In this paper we will try to clarify the existing data on the management of essential hypertension in childhood, its pathology and management, mainly referring to the correlations between the different stages of hypertension and the individual values of birth weight and gestational age, in 60 children with essential hypertension, during a 4-year study at the St. Mary Emergency Clinical Hospital for Children in Iași, Romania.

MATERIALS AND METHODS

Patients

We studied all cases of essential hypertension admitted in a four-year period to the Saint Mary Emergency Clinical Hospital for Children. Blood pressure was measured using a standardized protocol. Before enrolment, written informed consent was obtained from the parents or guardians of the children. Of the 60 children enrolled after establishing a diagnosis of essential hypertension, 36 patients had a normal BMI, 14 children were classified as overweight hypertensive and 10 patients as obese hypertensive, according to the age and sex-specific cut-off points of child overweight and obesity defined by the International Obesity Task Force (Cole et al., 2000). None of the patients had received any treatment for the control of hypertension. Regarding weight at birth, the children were divided into 3 groups: group 1 consisted of
children with a birth weight less than 2500 g, group 2 consisted of children with a birth weight more than 2500 g but less than 4000 g and the third group of children had a birth weight more than 4000 g.

RESULTS

In the investigated groups, three categories of children were identified according to gestational age: gestational age less than 37 weeks (stage 1) – 8 children (13.3%); gestational age greater than or equal to 37 weeks but less than 42 weeks (stage 2) – 47 children (78.3%) and gestational age greater than or equal to 42 weeks (stage 3) – 5 children (8.3%).

We focused our attention on the correlations between the different stages previously described for hypertension and the individual values of weight at birth and gestational age. Regarding the correlations we observed between the stages of essential hypertension and the individual values for weight at birth of the children selected for this study, we observed a very significant negative correlation, as shown by the increased value of r coefficient (r=-0.423) and the decreased value of p=0.001. We also obtained a significant negative correlation between the individual values of gestational age, as expressed in weeks, and the established stages of essential hypertension: n=60, r=-0.321, p=0.012. In addition, we observed very significant negative correlations between the stages of birth weight and gestational age and the stages of the essential hypertension, as follows: stages of birth weight vs. stages of hypertension (n=60, r=-0.495, p<0.0001) and stages of gestational age vs. stages of hypertension (n=60, r=-0.351, p<0.006).

DISCUSSION

High blood pressure is the major cause of cardiovascular diseases. It was recently shown that arterial hypertension is the main cause of mortality in the world and the second cause of morbidity (after prematurity) in children (World Health Organization, 2002). It is thought that the prevalence and rate of diagnosis of juvenile hypertension appear to be increasing (Sorof et al., 2004). This is mainly due to the growth in prevalence of infantile obesity but also to changes in dietary habits, reduction in physical activity and increasing stress (Mohan et al., 2004). In terms of prematurity, a higher risk of essential hypertension after the age of 12 years was noted in children with a gestational age less than 37 weeks. Barker et al. (1989) showed an independent association between low birth weight and the risk of hypertension, while cardiovascular disease has been highlighted in multiple populations from different geographic areas (Lawlor et al., 2005; Nilsson et al., 1997; Curhan et al., 1996).

It is generally believed that there is an increased risk of developing essential hypertension in prematurely born children. In a study published recently, Norman et al. (2010) revealed a higher total antioxidant status (TAS) by an average of 10 mmHg in adolescents and young adults prematurely born, when compared to those born at term. Additionally, previous reports showed that unhealthy dietary habits, physical inactivity and childhood obesity are the main cause of essential hypertension in children (van Swijndregt et al., 1996).

An important aspect that could be relevant in the context of the present study could be the association between inflammation and the risk of hypertension. In our research over the last 4 years, it was found that for a C-reactive protein (CRP) concentration above 3.5 mg/l there is a significantly increased risk of developing hypertension after the age 12. Moreover, recent epidemiological, clinical and experimental data suggest that CRP can directly influence atherogenesis. These studies indicated that CRP elevated serum values are directly related to vascular atherosclerotic changes in children, independent of the presence of conventional risk factors (Hashimoto et al., 2001).

There are recent reports in the literature indicating a direct relationship between the level of CRP and BMI in children (Cook et al., 2000). This could be explained by the increased releasing of the tumor necrosis factor in adipocytes (Hotamisligil et al., 1995), which causes increased synthesis of IL-6, the main stimulus of CRP hepatic secretion (Heinrich et al., 1990). Additionally, a recent study showed the role of
CRP in the intercellular adhesion molecules (ICAM) adhesion molecule expression in the endothelial cells (Pasceri et al., 2000).

To conclude, we found significant correlations between birth weight and gestational age and the different stages of juvenile essential hypertension.

REFERENCES


