

## Paediatric Arterial Hypertension

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The prevalence of hypertension in childhood and adolescence has increased in recent decades in parallel with the growing prevalence of obesity and changed lifestyles<sup>1</sup>. High blood pressure (BP) in childhood and adolescence tends to persist into adulthood, due to a tracking phenomenon that is especially pronounced in the presence of obesity<sup>2</sup>. Moreover, the majority of modifiable risk factors for high BP, such as eating habits and salt intake, are known to be imprinted in childhood and to persist beyond, making it crucial to address these issues early in life so as to influence the disease burden in adults<sup>3,4</sup>. Therefore, the topic of potential cardiovascular morbidity and mortality associated with paediatric hypertension is of particular concern.

Hypertension (HTN) is a multifactorial disease resulting from a complex network of interactions between genetic, epigenetic, environmental, and behavioural factors. Primary HTN is the most common type in adulthood, whereas secondary forms were traditionally predominant in childhood. However, primary hypertension has currently become more common<sup>5</sup>, probably due to the significant increase in overweight and obesity, especially in older children and adolescents.

It is important to provide paediatricians and paediatric nephrologists with the skills to study and address primary hypertension. This involves providing guidance on healthy eating habits and regular exercise, but the impact of excessive salt consumption on high BP is often underestimated. The effect of salt on BP seems to be heterogeneous and dependent on multiple environmental and genetic factors, including salt sensitivity. Since early childhood, there seems to be a programming effect between salt intake and BP, that will continue throughout life. This issue of *Anales de Nefrología Pediátrica* reviews the impact of salt consumption on BP and cardiovascular health, providing important information on physiological needs, recommendations on daily salt intake, and reliable methods to assess sodium intake. Updated evidence on the effects of salt on BP and cardiovascular health will also be discussed, along with strategies for reducing salt intake<sup>6</sup>.

In terms of clinical practice, defining hypertension in paediatric patients poses a significant challenge. In adults, the definition and treatment target values for HTN are established on the basis of scientific evidence about their association with cardiovascular events. Conversely, in

children, cut-off values are statistically defined based on each child's height, age, and gender, which leads to several difficulties, including the choice of the most appropriate reference tables. While office BP measurement has long been considered the reference method for defining hypertension, there is increasing recognition of the benefits of 24-hour ambulatory BP monitoring and home BP measurement (commonly referred to as self-measurement in adults, although younger children require assistance). Recent recommendations for the use of a similar approach in cases of suspected hypertension in children advocate 24-hour ambulatory BP monitoring to confirm the diagnosis and inclusion of home BP assessment in the diagnostic process<sup>7</sup>.

We do not specifically address the difficulties posed by the diagnosis of hypertension in children in our current issue; however, we do review "Early Vascular Aging and New Approaches to Paediatric Hypertension"<sup>8</sup>. The review represents a step forward, aims to raise awareness about the use of new strategies that can help better characterise the vascular phenotype in individuals with hypertension, and explores their impact on future cardiovascular risk estimation. Numerous risk factors can accelerate the process of age-related atherogenesis. New techniques and approaches to vascular status in the paediatric population are gaining increasing recognition, and several methods have been employed to evaluate the new concept of "early vascular aging". Nevertheless, distinguishing between the healthy vascular ageing of vessels and the pathological impact of cardiovascular risk factors on the vascular system poses a major challenge, especially during childhood. As a result, we considered it essential to provide a comprehensive review of the available evidence on this topic.

Following the structure of the journal, we include two clinical cases. The first is that of an adolescent with no previous medical history other than their premature birth at 36 weeks, and an acute kidney injury during the neonatal period, which was not followed up during childhood<sup>9</sup>. The patient presented a hypertensive emergency with target organ damage; however, even after a full study, it was not possible to establish a definitive diagnosis. This case not only highlights the importance of follow-up and monitoring after an episode of acute kidney injury, especially in patients with additional risk factors for chronic kidney disease, such as premature birth (a classic example of low nephron endowment), but also the importance

of addressing hypertension emergencies with care.

A suitable level of care and expertise for the prompt diagnosis and management of these rare conditions, associated with high morbidity and mortality, is well explained in the brief review, “Manejo de urgencias y emergencias hipertensivas en niños”<sup>10</sup>. The article emphasises the importance of initiating therapy with fast-acting, short half-life, highly effective drugs and the experience of the medical centre, which is crucial to achieve the best possible approach; one that is tailored to each patient’s characteristics, in addition to the availability of and experience with each drug. The objective is to promptly achieve acceptable BP levels and prevent progressive damage of the kidney or any other target organ.

Finally, we offer the clinical case of a previously healthy 8-year-old boy, referred to paediatric consultation after presenting high BP values (above 99<sup>th</sup> percentile)<sup>11</sup>. This case highlights the importance of investigating the secondary causes of hypertension in young children with severe high BP: renal diseases, including renovascular hypertension, are often the cause. The boy presented a hemodynamically significant stenosis in the right renal artery and a contralateral multicystic dysplastic kidney. One year after successful angioplasty and stent placement, renal thrombosis led to a bad outcome, resulting in reliance on renal replacement therapy.

In dedicating this issue to hypertension in children and adolescents, we aim to raise awareness of the importance of regular BP assessment in healthy children. Emphasis should be on a non-pharmacological approach to hypertension, particularly addressing excessive salt consumption and its consequences on cardiovascular health. The paediatric section of the *2023 European Society of Hypertension guidelines* stress the associations between BP and obesity, dyslipidaemia, diabetes, and sleep disorders, which indicates the necessity for a holistic approach<sup>7</sup>.

Novel methods to assess vascular damage are gaining increasing recognition. They have an immediate impact in the health of children but also play a vital role in identifying children at greater risk for adult subclinical target organ damage. After a diagnosis of hypertension, an aetiological study should be conducted to exclude the most common secondary causes. It is also extremely important to assess hypertension-mediated target organ damage, in order to optimise follow-up and treatment. Furthermore, specialised teams should tackle hypertension emergencies employing a state-of-the-art, case-by-case approach. A proactive, preventive approach to children with hypertension is essential to promote long-term health and well-being, as well as reduce global cardiovascular burden.

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