

## Correspondence

### Impact of body mass index on high blood pressure among obese children in the western region of Saudi Arabia

*To the Editor*

I have 3 comments on the distinguished study by Al-Agha and Mahjoub on the impact of body mass index (BMI) on high blood pressure (BP) among obese children in the western region of kingdom of Saudi Arabia (KSA).<sup>1</sup>

First, Al-Agha and Mahjoub found that BMI increased systolic BP (SBP) by 1.722 mm Hg ( $p=0.001$ ), and diastolic BP (DBP) by 0.901 mm Hg ( $p=0.006$ ) in boys, and 0.969 mm Hg ( $p=0.036$ ), and DBP by 0.704 mm Hg ( $p=0.045$ ) in girls.<sup>1</sup> They concluded that elevated BMI is associated with significantly increased DBP and SBP in obese children, especially in children older than 11 years.<sup>1</sup> They pointed one study limitation as they completed only 2 measurements of BP instead of the gold standard approach of 3 separate measurements.<sup>1</sup> I presume that the following 2 limitations might be additionally contributory.

1) Al-Agha and Mahjoub<sup>1</sup> conducted their cross-sectional study between August 2016 and March 2017. They referred to the Centers for Disease Control (CDC) growth charts to estimate BMI percentiles for each subject.<sup>1</sup> It is explicit that in the clinical field, there are many growth charts used to measure various anthropometric parameters in children, notably World Health Organization (WHO) charts, CDC charts, and country-specific charts. Comparing the use of other charts to the use of the country-specific growth charts suggested that the latter might describe the growth of children more precisely.<sup>2</sup> In certain populations, the clinical implementation of national charts showed unique patterns of BMI curves compared to WHO and CDC references. These national charts were considered useful as a reference for comparing different regions and for monitoring changes over time.<sup>3</sup> To my knowledge, L, M, and S parameters and z scores were calculated for weight, height, and BMI for Saudi school-age children and adolescents and they have been launched in 2016 for more accurate assessment of growth and nutrition in various clinical conditions and research.<sup>4</sup> The L, M, and S parameters and z scores for weight for age, height for age, and BMI for age for boys and girls have been presented in detailed tables across the age of commonly used z scores (+3, +2, +1, 0, -1, -2, -3). Moreover, graphs corresponding to the same parameters (weight, height, and BMI) showing the main z scores across all ages from 5 to 18 years have been illustrated.<sup>4</sup> I wonder

why Al-Agha and Mahjoub<sup>1</sup> did not refer in their study to the national Saudi growth charts to precisely estimate BMI percentiles instead of CDC charts. I presume that if they employed national BMI standards, the study results might be altered. 2) In the methodology, Al-Agha and Mahjoub<sup>1</sup> used 2004 National High Blood Pressure Education Program Working Group (NHBPEPWG) guidelines for the classification of BP measurements in the studied population. It is obvious that BP levels might vary in populations because of various factors, including genetic, ethnic, nutritional, and socioeconomic backgrounds. Establishing the local reference values based on the aforementioned factors is advocated to understand better the BP profile and stages of hypertension in a given community.<sup>5</sup> To my knowledge, reference values for the distribution pattern of SBP and DBP for Saudi children and adolescents were constructed more than a decade ago.<sup>6</sup> I wonder again why Al-Agha and Mahjoub<sup>1</sup> did not refer in their study to the national Saudi BP reference values to accurately estimate BP pattern instead of 2004 NHBPEPWG guidelines. I presume that if they adopted national BP data, different results might be obtained.

Second, Al-Agha and Mahjoub mentioned that high BMI significantly correlated with increased SBP and DBP in obese children. However, waist hip ratio did not show significant correlation.<sup>1</sup> It should be noted that children and adolescents with low BMI but large waist circumference (WC) might have an increased risk of increased BP and their health risks would be underestimated if screening by BMI alone was carried out. Therefore, estimation of WC might be an assistive tool when using BMI to identify hypertension risks.<sup>7</sup>

Third, pediatric hypertension and obesity have both been on the rise worldwide. Each is associated with increased risk of cardiovascular diseases and both track into adulthood, increasing significantly the morbidity and mortality.<sup>8</sup> All obese children are suggested to be screened for hypertension.<sup>8</sup> To my knowledge, obesity and hypertension are worrisome health hazards in KSA. Based on the significant contribution of elevated BMI to the increased DBP and SBP in obese Saudi children<sup>1</sup> and the substantial prevalence of obesity (19.2%) and hypertension (17.2%) among Saudi children aged 11-18 years,<sup>9</sup> I presume that screening obese children for hypertension in KSA needs to be seriously considered.

*Mahmood D. Al-Mendalawi*  
*Department of Pediatrics*  
*Al-Kindy College of Medicine*  
*University of Baghdad*  
*Baghdad, Iraq*

### *Reply from the Author*

We are thankful to Professor Al-Mendalawi for his comments on our article "Impact of body mass index on high blood pressure among obese children in the western region of Saudi Arabia".<sup>1</sup> We do agree with his valuable comment.

*Abdulmoein E. Al-Agha*  
*Pediatric Endocrinology & Diabetes Section*  
*Department of Pediatric*  
*King Abdulaziz University Hospital,*  
*Jeddah, Kingdom of Saudi Arabia*

### *References*

1. Al-Agha AE, Mahjoub AO. Impact of body mass index on high blood pressure among obese children in the western region of Saudi Arabia. *Saudi Med J* 2018; 39: 45-51.
2. Ziegler EE, Nelson SE. The WHO growth standards: strengths and limitations. *Curr Opin Clin Nutr Metab Care* 2012; 15: 298-302.
3. Ma J, Wang Z, Song Y, Hu P, Zhang B. BMI percentile curves for Chinese children aged 7-18 years, in comparison with the WHO and the US Centers for Disease Control and Prevention references. *Public Health Nutr* 2010; 13: 1990-1996.
4. El Mouzan MI, Al Salloum AA, Alqurashi MM, Al Herbish AS, Al Omar A. The LMS and Z scale growth reference for Saudi school-age children and adolescents. *Saudi J Gastroenterol* 2016; 22: 331-336.
5. Subhi MD. Blood pressure profiles and hypertension in Iraqi primary school children. *Saudi Med J* 2006; 27: 482-486.
6. Al Salloum AA, El Mouzan MI, Al Herbish AS, Al Omar AA, Qurashi MM. Blood pressure standards for Saudi children and adolescents. *Ann Saudi Med* 2009; 29: 173-178.
7. Zhang YX, Zhao JS, Chu ZH. Children and adolescents with low body mass index but large waist circumference remain high risk of elevated blood pressure. *Int J Cardiol* 2016; 215: 23-25.
8. Brady TM. Obesity-Related Hypertension in Children. *Front Pediatr* 2017; 5: 197.
9. Hothan KA, Alasmari BA, Alkhelaiwi OK, Althagafi KM, Alkhalidi AA, Alfityani AK, et al. Prevalence of hypertension, obesity, hematuria and proteinuria amongst healthy adolescents living in Western Saudi Arabia. *Saudi Med J* 2016; 37: 1120-1126.