

## Essential Hypertension Onset in a 12-Year-Old Adolescent (Permulaan Tekanan Darah Tinggi pada Remaja 12 Tahun)

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### ABSTRACT

*Essential hypertension in adolescents is increasing in trend worldwide in view of increasing prevalence of childhood obesity and sedentary lifestyle. Generally, secondary hypertension is suspected if it occurs at pre-pubertal age or presented with resistant hypertension. We reported a case of 12-year-old adolescent male diagnosed with essential hypertension during opportunistic screening with suboptimal blood pressure control at primary care. Poor response of his blood pressure control despite his compliance to medications had cause him emotional distress. We referred this child for assessment of secondary hypertension but it turned out to be negative. Surprisingly, his blood pressure responded well with prazosin and diltiazem combination during adjustment period prior to renovascular assessment. His hypertension is well controlled till now. This case proved that essential hypertension is still possible in early non-morbid obese adolescent despite negative family history of hypertension. Individualised treatment should be adapted rather than questioning the compliance of the adolescent.*

*Keywords: Adolescent; diltiazem; hypertension; prazosin*

### ABSTRAK

*Kes tekanan darah tinggi dalam kalangan remaja semakin meningkat oleh kerana peningkatan kes kegemukan dan pengamalan gaya hidup yang tidak sihat sejak daripada usia kanak-kanak. Secara umumnya, tekanan darah akibat punca kesihatan yang lain perlulah dikenal pasti terutama jika tekanan darah tinggi terjadi pada usia sebelum akil baligh atau pada keadaan tekanan darah yang sukar untuk dikawal. Kami sertakan laporan kes berkaitan remaja lelaki berusia 12 tahun yang telah dikenal pasti mengalami tekanan darah tinggi yang sukar untuk dikawal secara optimum di klinik kesihatan. Kawalan tekanan darah yang tidak berkesan biarpun telah mematuhi pengambilan ubat yang disyorkan telah mengakibatkan tekanan emosi kepada remaja ini. Justeru kami telah merujuk remaja ini kepada pihak hospital namun rawatan susulan mendapati remaja ini tidak mempunyai masalah lain berkaitan darah tinggi beliau. Tanpa dijangka, bacaan tekanan darahnya menjadi terkawal dengan pengambilan ubat prazosin dan diltiazem sebelum menjalani penilaian fungsi saluran darah buah pinggang. Ternyata tekanan darahnya menjadi terkawal sehingga sekarang. Kes ini berjaya membuktikan tekanan darah tinggi boleh terjadi pada usia awal remaja yang tiada masalah obesiti mahupun tiada sejarah darah tinggi keturunan. Pencarian ubat darah tinggi yang sesuai untuk kawalan darah tinggi dalam kalangan remaja perlulah menjadi keutamaan berbanding mempertikaikan kejujuran remaja dalam mengambil ubat seperti yang telah ditetapkan.*

*Kata kunci: Darah tinggi; diltiazem; prazosin; remaja*

### INTRODUCTION

The prevalence of hypertension in adolescents is increasing in trend due to the sedentary lifestyle, which imposed high cardiovascular risks at a young age (Anyaegbu & Dharnidharka 2014; Flynn et al. 2017; Matoo 2019a). It is mostly related with essential hypertension and metabolic syndrome (Anyaegbu & Dharnidharka 2014; Flynn et al. 2017; Matoo 2019a). The child and adolescent with chronic illness usually have been labelled as a high-risk group for non-compliance towards medications and follow up (Eden et al. 2011; Matoo 2019b). This stigma can lead to poor self-esteem and demotivation, which will finally end up with treatment failure (Compas et al. 2012; Raj & Kumar 2010;

Santos et al. 2016). The stigma of non-compliance is evolved further whenever the child is not responsive to the first line of antihypertensive agents. However, healthcare providers should be aware of the principle of individualised treatment in which patients may respond differently to different antihypertensive agents. Even though consensus has highlighted angiotensin converting enzyme inhibitor group as the drug of choice, healthcare providers should also be able to modify medications accordingly, since an individualised response to certain drugs is unpredictable (Flynn et al. 2017; Rao 2016). This includes the possibility of using alpha blocker and non-dihydropyridines, even in adolescents (Rodriguez-Cruz 2017).

## CASE REPORT

We report a case of 12-year-old adolescent male diagnosed with hypertension during opportunistic screening, with suboptimal blood pressure control at primary care. He is overweight with a BMI of 27.0 kg/m<sup>2</sup>. He is a non-smoker. He has good academic performance with good family support. All his family members are normotensive with ideal body weight. He has no clinical and biochemical features of secondary hypertension from the initial assessment. He has emotional distress displayed by a lack of motivation to attend the clinic for follow-up due to poor response of his blood pressure control. He also blamed his overweight as the main reason for his hypertension. After adequate counselling, we managed to motivate the parents and the adolescent for further referral including to the dietitian and occupational therapist for appropriate diet and weight reduction prescription. We also taught him on a relaxation technique and behaviour modification in order to increase his self-esteem and confidence level. In view of worsening blood pressure control despite good compliance on different recommended antihypertensive drugs and lifestyle modification, we referred this patient for further work-up and shared care with the endocrinology team. However, the results turn up to be normal. Surprisingly, his blood pressure responded well with prazosin and diltiazem during the adjustment period prior to assessment for renovascular hypertension. His hypertension is well controlled until now. Table 1 shows the result of his main investigations for his hypertension assessment.

TABLE 1. Hypertension assessment result for this adolescent

Investigation	Result
UFEME	Normal (no proteinuria)
Creatinine	63.0umol/l
Potassium	3.8 mmol/l
ECG	Sinus rhythm, no ischemic changes or abnormality
U/S KUB/Doppler	Normal
Serum Cortisol	235.8 nmol/l

## RESULTS AND DISCUSSION

Hypertension has been reported to occur even at younger age group in our country. Based on our national health and morbidity survey, the prevalence of known hypertension among adolescent is 6.7%, which is higher compared to the worldwide data of those ages less than 18 (Bell et al. 2019; Tahir et al. 2015). The initial approach to hypertension in adolescents is similar to adults. Screening for secondary causes should be done via adequate history taking, physical examination and individualized baseline investigation (Flynn et al. 2017; Mattoo 2019a; Rao 2016; Rodriguez-Cruz 2017). Not all the recommended lists of investigations

for secondary hypertension screening need to be done in children and adolescents. This is because the tests should act as a complementary investigation in response to the initial thorough clinical assessment and physical findings rather than being the main decision tool (Flynn et al. 2017; Mattoo 2019a, 2019b; Neutze & Viera 2010). Furthermore, the sensitivity and specificity of the tests are low, which will not benefit the mass screening in terms of its cost effectiveness. Excessive investigations will also lead to further emotional burden to the child and parents in view of frequent blood takings and imaging procedures that will consume more time, energy and cause more worries (Compas et al. 2012; Flynn et al. 2017; Rao 2016; Rodriguez-Cruz 2017; Santos et al. 2016). Therefore, clinical correlation during the initial assessment is indeed superior in deciding specific investigation. Criteria which favours primary hypertension in our case included the age of onset of more than 10-years old with underlying overweight despite no family history of similar comorbidity.

In any case of hypertension, initial assessment of investigation aims to identify features suggestive of target organ damage and possible clues to secondary hypertension (Anyaeibu & Dharnidharka 2014; Eden et al. 2011; Flynn et al. 2017; Mattoo 2019a, 2019b; Neutze & Viera 2010). In our case, all his investigations' values are within the normal range. Surprisingly, his blood pressure control is still sub-optimal despite several medications had been changed and introduced. Because of that, his compliance towards medications was questioned. It has caused the adolescent to be emotionally disturbed and started to default his treatment. Previous studies have shown that excessive rules and high demand for changes in a child and adolescent with a chronic illness will lead to emotional instability and depression (Compas et al. 2012; Santos et al. 2016). In our case, eventually, we were able to regain back his confidence and self-esteem by engaging well with his opinion and worries. We also praised and assigned him as the decision maker and empowered him with blood pressure monitoring at home. These are among the techniques that will indirectly involve the adolescent with the management team and reduce their negative thoughts (Compas et al. 2012; Santos et al. 2016). However, we realized that his blood pressure remains the same. Given that overweight may contribute to hypertension through the development of renal disease and increment of volume expansion by activation of the renal-angiotensin system, we decided to concentrate on him to lose weight (Jiang et al. 2016). However, this weight reduction plan later causes more distress to him. By involving the dietician together with the occupational therapist to coach him in anger management and anxiety control, he was able to lose his weight effectively. He has benefited good support from his parents and family members. Indeed, discussion and psychosocial support are among the most important prognostic factor for children with chronic illness (Compas et al. 2012; Santos et al. 2016).

The approach in managing adolescents with chronic illness needs to include soft skills and great listening attitude towards them, rather than monotonous advice by the healthcare providers (Compas et al. 2012; Flynn et al. 2017; Raj & Kumar 2010; Rao 2016; Rodriguez-Cruz 2017; Santos et al. 2016). The treatment goals need to be realistic, achievable and staggered in longer duration. One to one consultation by seeing the adolescent alone without any family members' interruption for a given period is very important so that he could feel free and comfortable for us to explore any sensitive issues, including his actual compliance with the medications in a non-judgemental manner. This is important in order to gain the adolescent's trust and avoid the adolescent from being embarrassed in front of others (Compas et al. 2012; Santos et al. 2016). Furthermore, the adolescent will have the freedom to answer and discuss his worries without the parents interrupting the conversation.

At a point where we managed to gain back his trust, we would expect the response to his treatment to be improved (Compas et al. 2012; Flynn et al. 2017; Raj & Kumar 2010; Rao 2016; Rodriguez-Cruz 2017; Santos et al. 2016). However, in our case, several medications have been given and tapered without any improvement. His blood pressure remains at systolic value (SBP) ranges of 150-154 mmHg and diastolic value (DBP) ranges of 90-100 mmHg despite being on two drugs combination. He was previously already on angiotensin converting enzyme inhibitor, calcium channel blocker and beta blocker. We decided to refer him to a tertiary centre for shared care and secondary hypertension workup. However, the assessment favoured the possibility of essential hypertension rather than secondary hypertension. In view of no contraindication of specific antihypertensive drugs in adolescents, we decided to change his medications to alpha blocker and non-dihydropyridine calcium channel blocker combination therapy. To our surprise, his blood pressure is well controlled, and we have continued this drugs combination until now. Prazosin is an alpha blocker which controls blood pressure by reducing arterial tone leading to vasodilatation through the peripheral postsynaptic blockade (Schmidt & Akbar 2018). Meanwhile, verapamil is a non-dihydropyridine calcium channel blockers which inhibit the influx of extracellular calcium across both myocardial and vascular smooth muscle cell membranes, therefore, prevents the contractile processes of myocardial smooth muscle cells, resulting in dilation of the coronary and systemic arteries (Schmidt & Akbar 2018). In addition, both drugs reduce total peripheral resistance, systemic blood pressure and afterload pressure, which may contribute to the significant blood pressure reduction in this case study.

Our case has proved the role of alpha blocker and non-dihydropyridine in controlling blood pressure in adolescents. Further study needs to be done to assess the secondary end points benefit of these drugs, especially in younger group of patients (Flynn et al. 2017; Messerli et al. 2010; Rao 2016; Rodriguez-Cruz 2017). Despite being

unlisted under the first-line therapy group, alpha blocker and non-dihydropyridine calcium channel blocker still have a role in controlling blood pressure (Flynn et al. 2017; Messerli et al. 2010; Rao 2016; Rodriguez-Cruz 2017). Previously, alpha blocker had more roles in patients with underlying lower urinary tract symptoms and added therapy in resistant hypertension. This is because of its inferior role in cardiovascular disease as proven in Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT trial) (Messerli et al. 2010). Meanwhile, non-dihydropyridines is used for arrhythmia disorder, such as supraventricular tachycardia and migraine prophylaxis. However, our case study showed that their role is also important as effective antihypertensive medications. Therefore, further study needs to be done to assess the extra benefits of these drugs in hypertension among adolescents.

#### CONCLUSION

Our case study demonstrates that essential hypertension is possible in early adolescent despite negative family history of hypertension, in which opportunistic blood pressure measurement is highly beneficial as a hypertension screening tool, beginning at the age of three years old as suggested by the latest clinical practice guideline. Even though alpha blockers and non-dihydropyridine calcium channel blockers are not among the recommended initial antihypertensive agents, treatments should be individualised and they still play a role in those with resistant hypertension in adolescents, provided that appropriate assessment has been done either in primary or tertiary care centres for secondary causes. Exploring compliance in adolescents should be done in a respectful manner in order to maintain their motivation and self-esteem to comply with the treatment. The possibility of underlying depression secondary to the burden of the chronic disease needs to be ruled out if the treatment outcome is still suboptimal.

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