

Subtle changes in blood pressure and pulse wave velocity in adolescents born very preterm with and without fetal growth restriction

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Background

Very preterm birth and fetal growth restriction (FGR) are associated with an increased risk for cardiovascular disease. Blood pressure dysregulation and changes in arterial stiffness in childhood are suggested mechanisms. It is unknown at what age changes are detectable and it is unclear whether FGR adds to the risk of very preterm birth.

The aims of this study were therefore to evaluate the independent and combined effects of very preterm birth and FGR on 1) blood pressure and blood pressure variability in adolescence; and 2) if aortic pulse wave velocity and distensibility in adolescence is affected.

Method

This prospective study included adolescents born very preterm with FGR, defined as birth weight <2 SD and absent or reversed end-diastolic blood flow in the umbilical artery, and two control groups with birth weight appropriate for gestational age (AGA): subjects born very preterm matched for gestational age at birth, and subjects born at term matched for year of birth. Blood pressure variability was assessed with 24-hour ambulatory blood pressure measurements. Thoracic pulse wave velocity and distensibility in the ascending and descending aorta were assessed by cardiovascular magnetic resonance using phase-contrast flow measurements and 3D non-contrast-enhanced angiography.

Results

Seventy-nine adolescents (13–17 years, 52% girls) were included; 24 preterm FGR, 27 preterm AGA and 28 term AGA. There were no differences in prevalence of prehypertension, hypertension, or arterial stiffness between groups (Table 1). A trend of increased blood pressure was observed in boys, where FGR added to the effect of preterm birth. Thoracic pulse wave velocity and distensibility in the thoracic aorta were similar between groups (Figure 1).

	Preterm FGR (n=20)	Preterm AGA (n=27)	Term AGA (n=23)	P-value
Daytime				
<u>Systolic blood pressure</u>				
Prehypertensive n (%)	1 (5)	2 (7)	0	0,63
Hypertensive n (%)	2 (10)	4 (15)	1 (4)	0,48
<u>Diastolic blood pressure</u>				
Prehypertensive n (%)	2 (10)	1 (4)	1 (4)	0,68
Hypertensive n (%)	0	0	0	N/A
Night-time				
<u>Systolic blood pressure</u>				
Prehypertensive n (%)	2 (10)	0	0	0,08
Hypertensive n (%)	3 (15)	1 (4)	0	0,1
<u>Diastolic blood pressure</u>				
Prehypertensive n (%)	1 (5)	0	0	0,29
Hypertensive n (%)	1 (5)	0	1 (4)	0,52
Pathological nocturnal dip (<10%) n (%)				
	3 (15)	3 (11)	2 (9)	0,9

Table 1. Clinical evaluation of 24-hour blood pressure measurements.

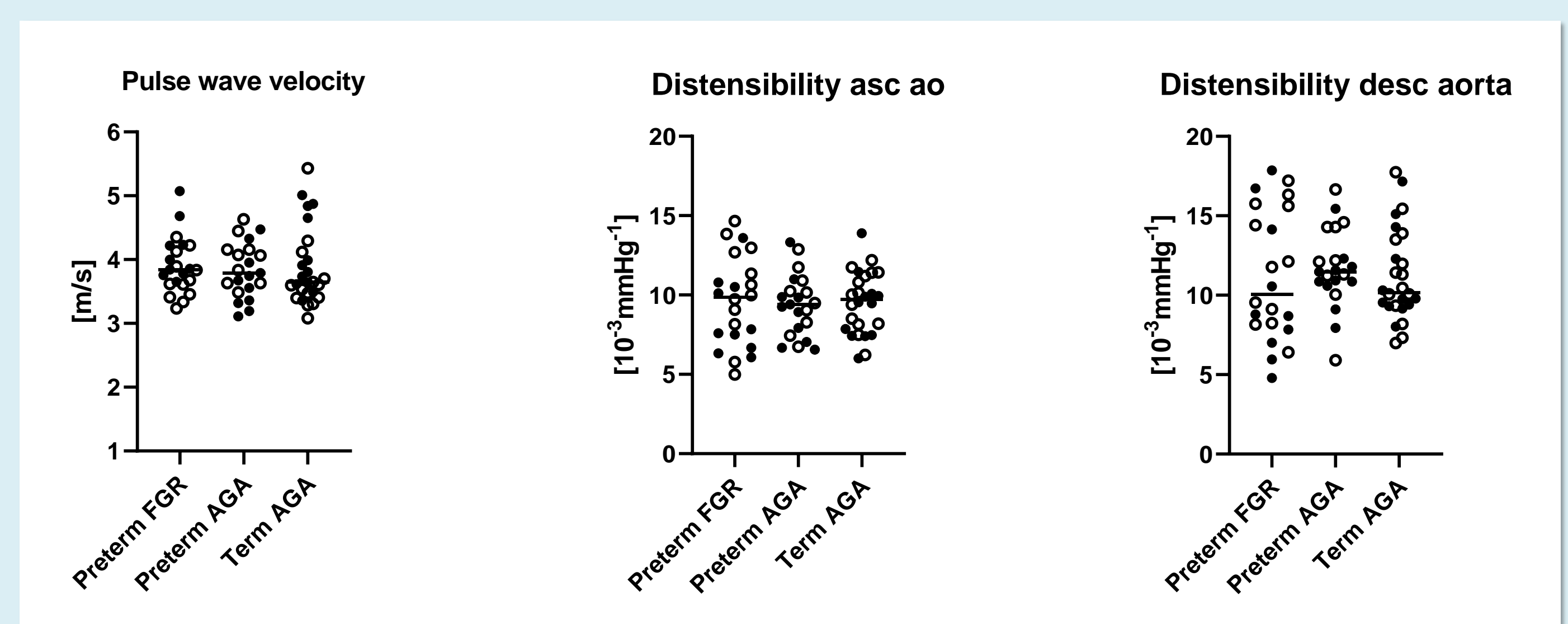


Figure 1. Pulse wave velocity (left), distensibility in the ascending aorta (middle) and distensibility in the descending aorta at the level of the diaphragm (right) Filled circles indicate boys and open circles indicate girls. Lines indicate median. No difference between groups was found for pulse wave velocity, ascending- or descending aortic distensibility ($p = 0.6$, $p=0.9$ and $p=0.6$, respectively).

Conclusion

The current findings indicate a lessened negative effect of very preterm birth and fetal growth restriction on the cardiovascular system as compared to that reported in earlier studies. A window of opportunity for prevention of future cardiovascular disease might thus still be open.