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Purpose

Childhood obesity epidemic leads an interest of pre-stage of hypertension; higher/elevated blood pressure (BP) status which BP numbers are lower than the criteria for diagnosing hypertension. In 2017, the clinical practice guidelines for pediatric BP management were published separately by Endocrine Society (ES) and American Academy of Pediatrics (AAP). The aims of this study are to evaluate the prevalence of elevated blood pressure (EBP) including hypertension (HTN) and the difference of those according to the guidelines in Korean adolescents.

Methods

We analyzed data of 1166 adolescents aged 13-17 years (male/female 611/555) from the Korea National Health and Nutrition Examination Survey (2014-2016). BP group were categorized as normal, EBP and HTN according to each guideline and prevalence of EBP and HTN were analyzed and compared. In ES guideline BP of >90th percentile to <95th percentile or >120/80 is prehypertension, BP ≥95th percentile to <99th percentile + 5 mm Hg is stage 1 HTN and BP ≥99th percentile + 5 mm Hg is stage 2 HTN. In AAP guideline, elevated BP is defined as >120/80 to 129/80 mm Hg, Stage 1 HTN is 130/80 to 139/89 mm Hg and Stage 2 HTN is BP ≥140/90 mm Hg

Results

Male - Systolic blood pressure Status

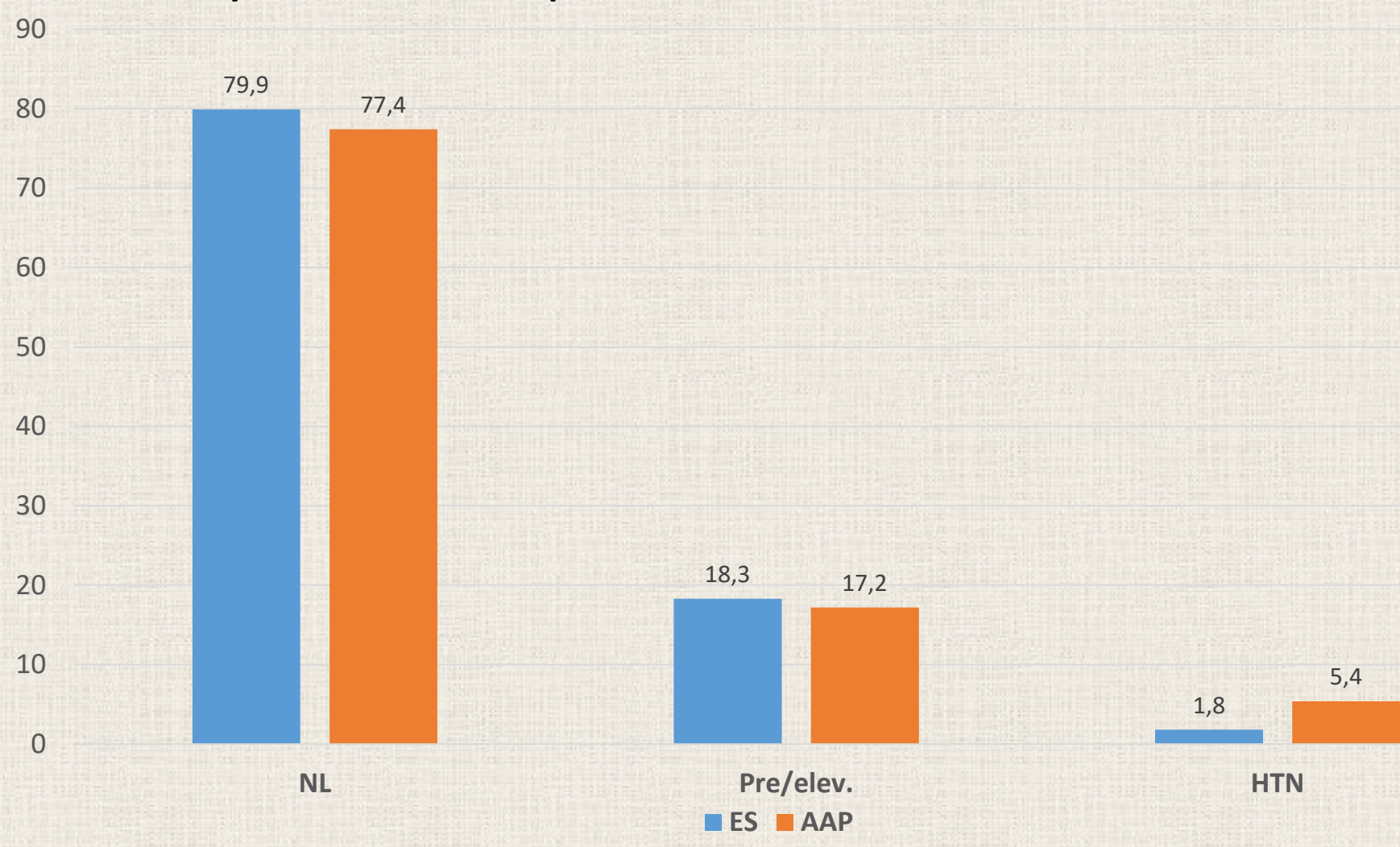


Fig.1a The comparison of the prevalence of systolic blood pressure status according to ES and AAP Guidelines. NL, normal blood pressure; Pre, pre-hypertension; elev., elevated blood pressure; HTN, hypertension

Male - Diastolic blood pressure Status

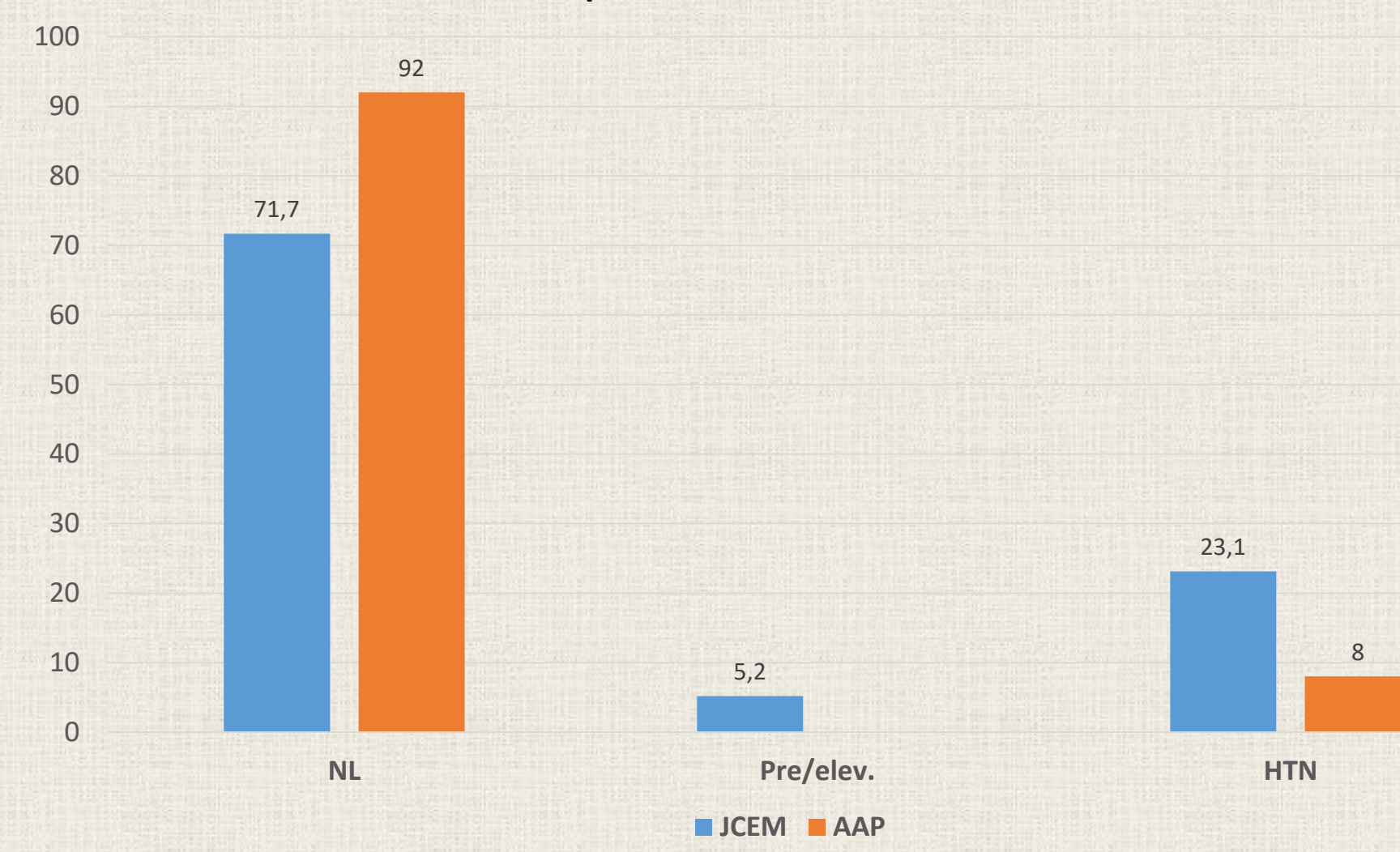


Fig.1b The comparison of the prevalence of diastolic blood pressure status according to ES and AAP Guidelines. NL, normal blood pressure; Pre, pre-hypertension; elev., elevated blood pressure; HTN, hypertension

Male - Hypertension Status

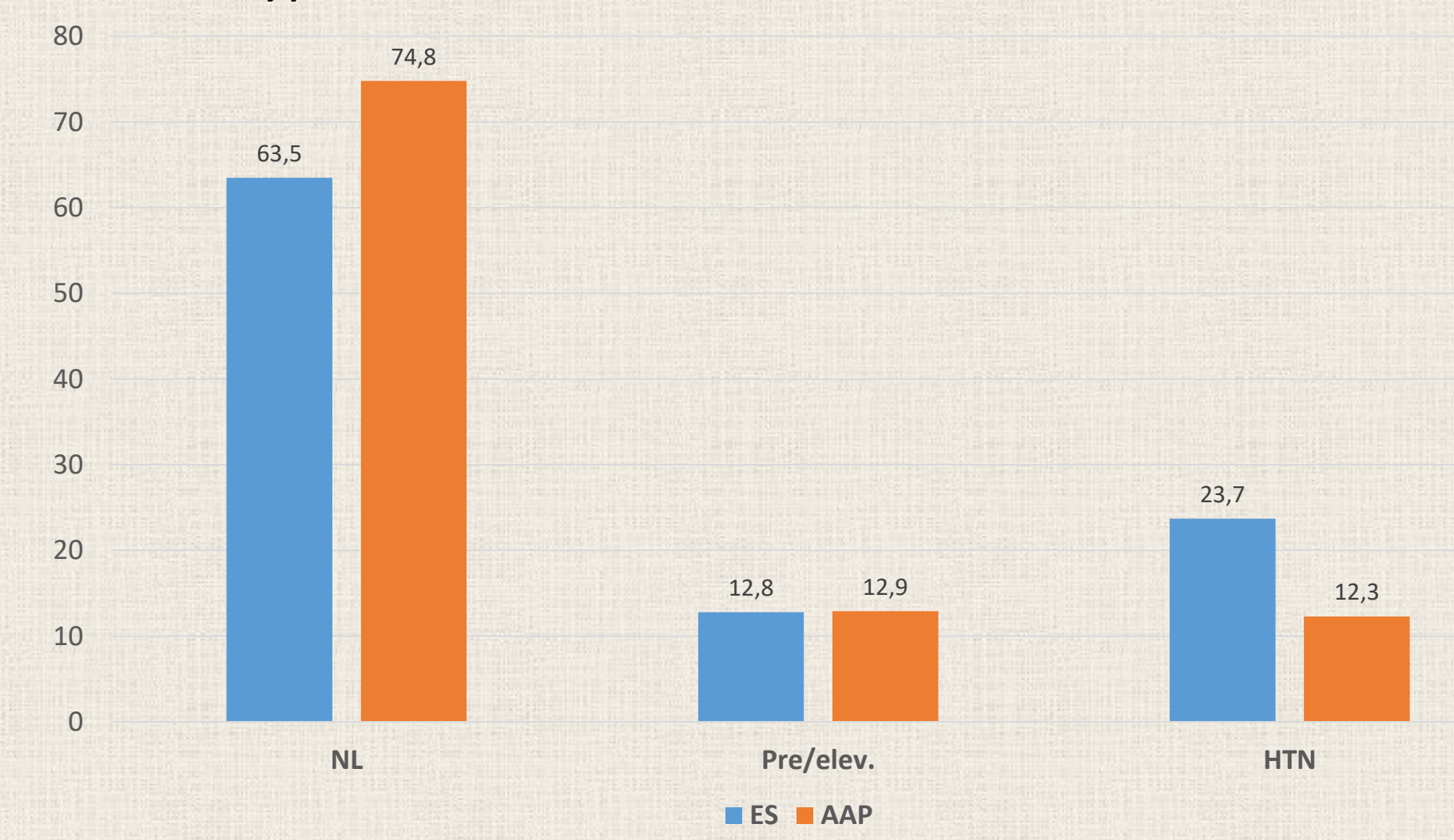


Fig.1c The comparison of the prevalence of blood pressure status according to JCEM and AAP Guidelines. NL, normal blood pressure; Pre, pre-hypertension; elev., elevated blood pressure; HTN, hypertension

Female - Systolic blood pressure Status

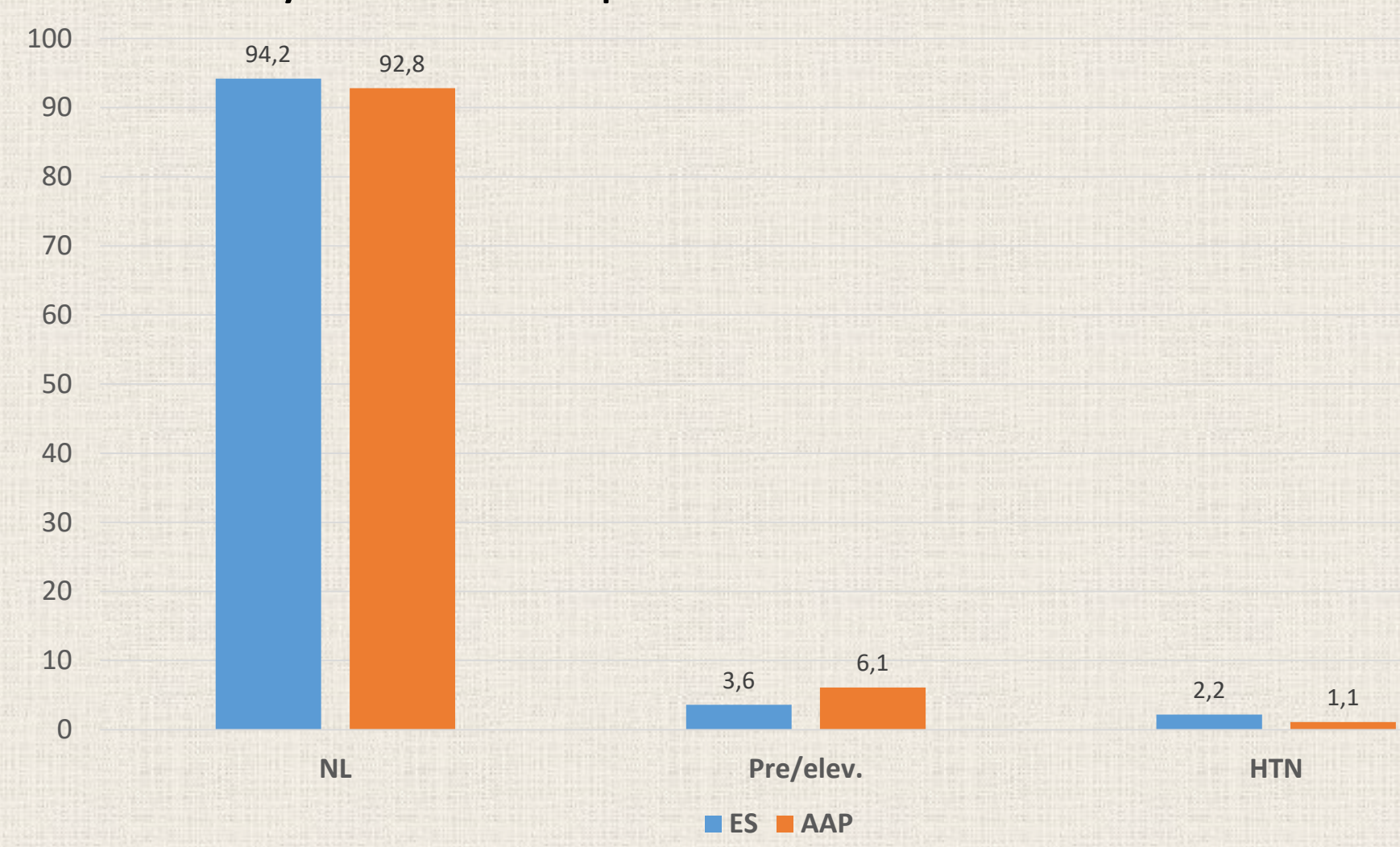


Fig.2a The comparison of the prevalence of systolic blood pressure status according to ES and AAP Guidelines. NL, normal blood pressure; Pre, pre-hypertension; elev., elevated blood pressure; HTN, hypertension

Female - Diastolic blood pressure Status

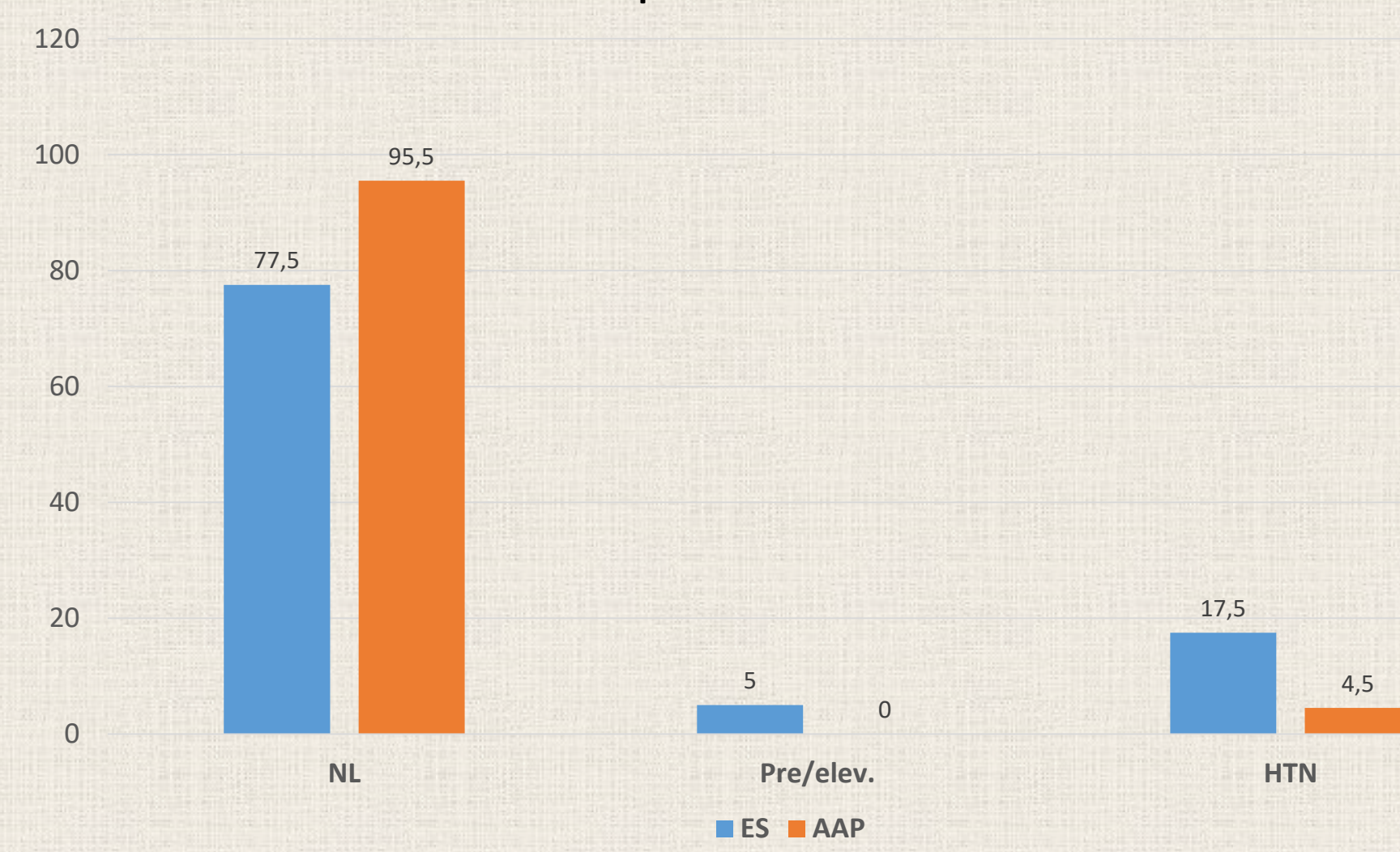


Fig.2b The comparison of the prevalence of diastolic blood pressure status according to ES and AAP Guidelines. NL, normal blood pressure; Pre, pre-hypertension; elev., elevated blood pressure; HTN, hypertension

Female - Hypertension Status

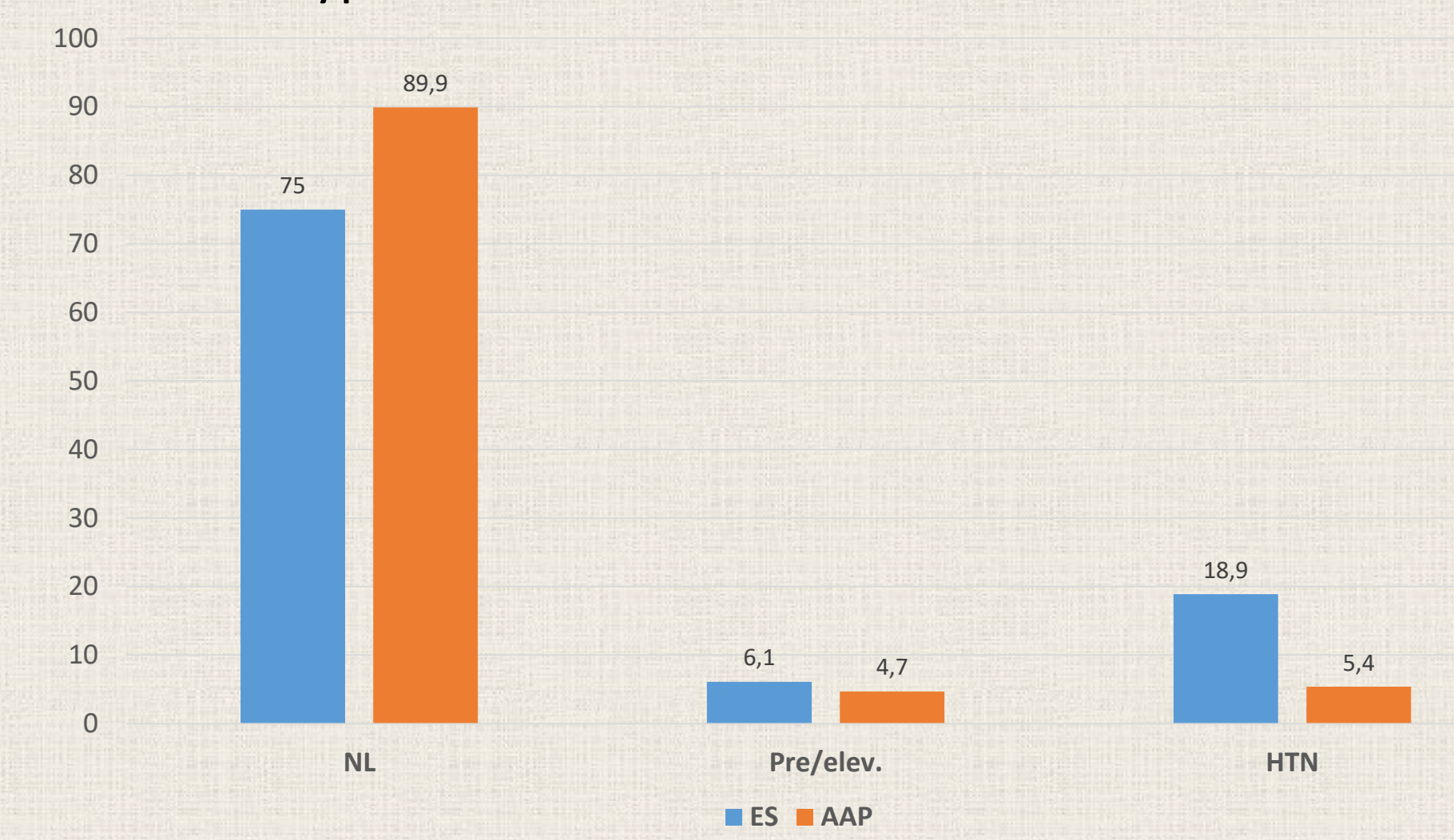


Fig.2c The comparison of the prevalence of blood pressure status according to ES and AAP Guidelines. NL, normal blood pressure; Pre, pre-hypertension; elev., elevated blood pressure; HTN, hypertension

Table 2. Multiple linear regression analysis model to systolic and diastolic blood pressure in male adolescents

R2	SBP	P	DBP	p
	β	p	β	p
	0.067	<0.0001	0.032	0.001
Height z-score	-0.03	0.91	0.44	0.11
Weight z-score	0.06	0.93	-1.42	0.05
BMI z-score	0.21	0.75	1.31	0.04
WC groups	0.06	0.9	0.12	0.03

BMI, body mass index; WC, waist circumference
 WC groups are divided into two groups, WC <90 percentile and WC ≥90 percentile to Korean standard growth curve 2017.

Table 3. Multiple linear regression analysis model to systolic and diastolic blood pressure in female adolescents

R2	SBP	p	DBP	p
	β	p	β	p
	0.084	<0.0001	0.02	0.001
Height z-score	0.6	0.14	0.66	0.12
Weight z-score	-2.06	0.06	-1.96	0.09
BMI z-score	2.05	0.04	1.8	0.07
WC groups	0.12	0.01	0.02	0.69

BMI, body mass index; WC, waist circumference
 WC groups are divided into two groups, WC <90 percentile and WC ≥90 percentile to Korean standard growth curve 2017.

Results

The average age was 14.97 years and body mass index (BMI) z-score was 0.06 and 0.08 in boys and girls, respectively. 23% of boys and 22% of girls were overweight including obesity. 11.8% of boys and 31.5% of girls were central obesity defined by waist circumference (WC) above 90th percentile for gender and age. Systolic BP was 111.99 and 106.13 mmHg, and diastolic BP was 67.39 and 66.63mmHg in boys and girls, respectively. BP was positively correlated with BMI z-score and WC percentile.

The prevalence of EBP was 36.5% vs. 25.2% according to ES and AAP, respectively in boys and 25.1% vs. 10.1% in girls. HTN prevalence was 23.7% vs. 12.3% in boys and 18.9% vs. 5.4% in girls. The prevalence of EBP and HTN were different by the guideline, in each gender. Prior to diagnosis of hypertension, 5% to 13% of adolescents could initiate life style intervention by EBP criteria.

Conclusion

One in three or four of Korean adolescents has increased blood pressure and the prevalence of EBP and HTN were different according to ES and AAP guideline. Early therapeutic interventions such as life style modification including diet and physical activity should be started in adolescents with EBP.

Reference

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