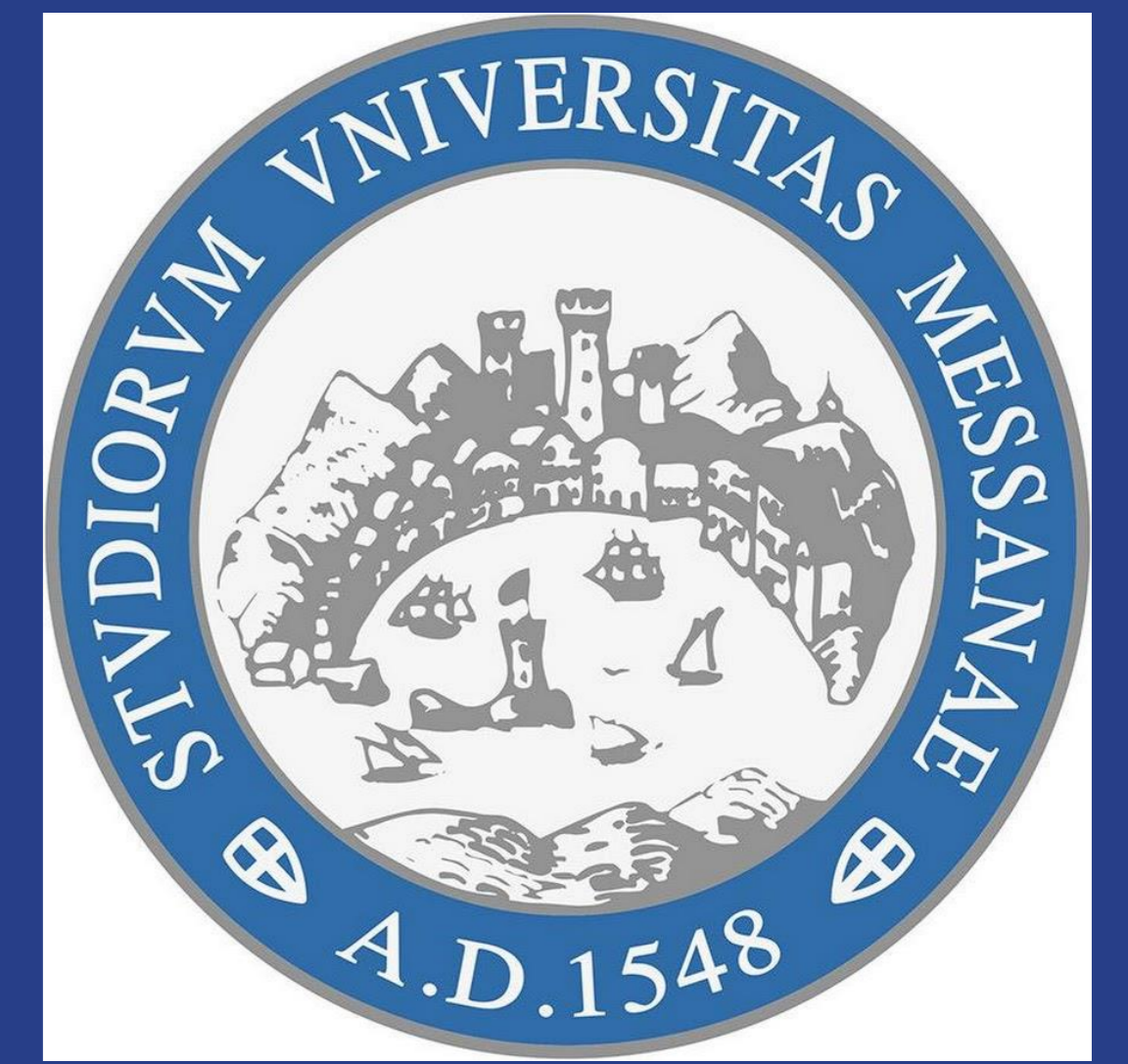


EARLY ADIPOSITY REBOUND IN CHILDREN WITH CONGENITAL HYPOTHYROIDISM DIAGNOSED BY NEWBORN SCREENING

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INTRODUCTION

It is reported that children with congenital hypothyroidism (CH) are at increased risk of developing childhood obesity. Moreover, it is known that the timing of adiposity rebound (AR) in childhood is strongly linked with future obesity.

AIM

Aims of our study were to explore the timing of AR and to identify factors affecting AR in a cohort of children with CH diagnosed by newborn screening and treated with levothyroxine.

METHOD

Patients with permanent CH diagnosed from 1994 to 2012 treated with levothyroxine from the first month of life and followed at least until 8 years of age were included in this study.

Subgroups of normal body mass index (BMI) and obesity/overweight (BMI \geq 85th percentile) by the latest BMI at 8 years of age and subgroups for different CH etiology (i.e. dysgenesis and dyshormonogenesis) were determined.

BMI at each age and the age of AR were compared with World Health Organization (WHO) references.

Correlation of age and BMI at AR with BMI at 8 years, initial severity of hypothyroidism and initial levothyroxine dosage were examined.

RESULTS

Sixty-nine patients (44 females) with permanent CH were recruited in this study.

The age at AR was 3.44 ± 1.36 and 3.36 ± 1.21 years in boys and girls, respectively, and occurred significantly earlier than in WHO references (5.0 years in boys and 5.6 years in girls, $p < 0.001$ for both sex).

Age at AR showed significant negative correlation with BMI at 8 years ($r = -0.274$, $p < 0.05$).

BMI at AR and at 8 years of age correlated positively ($r = 0.460$, $p < 0.001$).

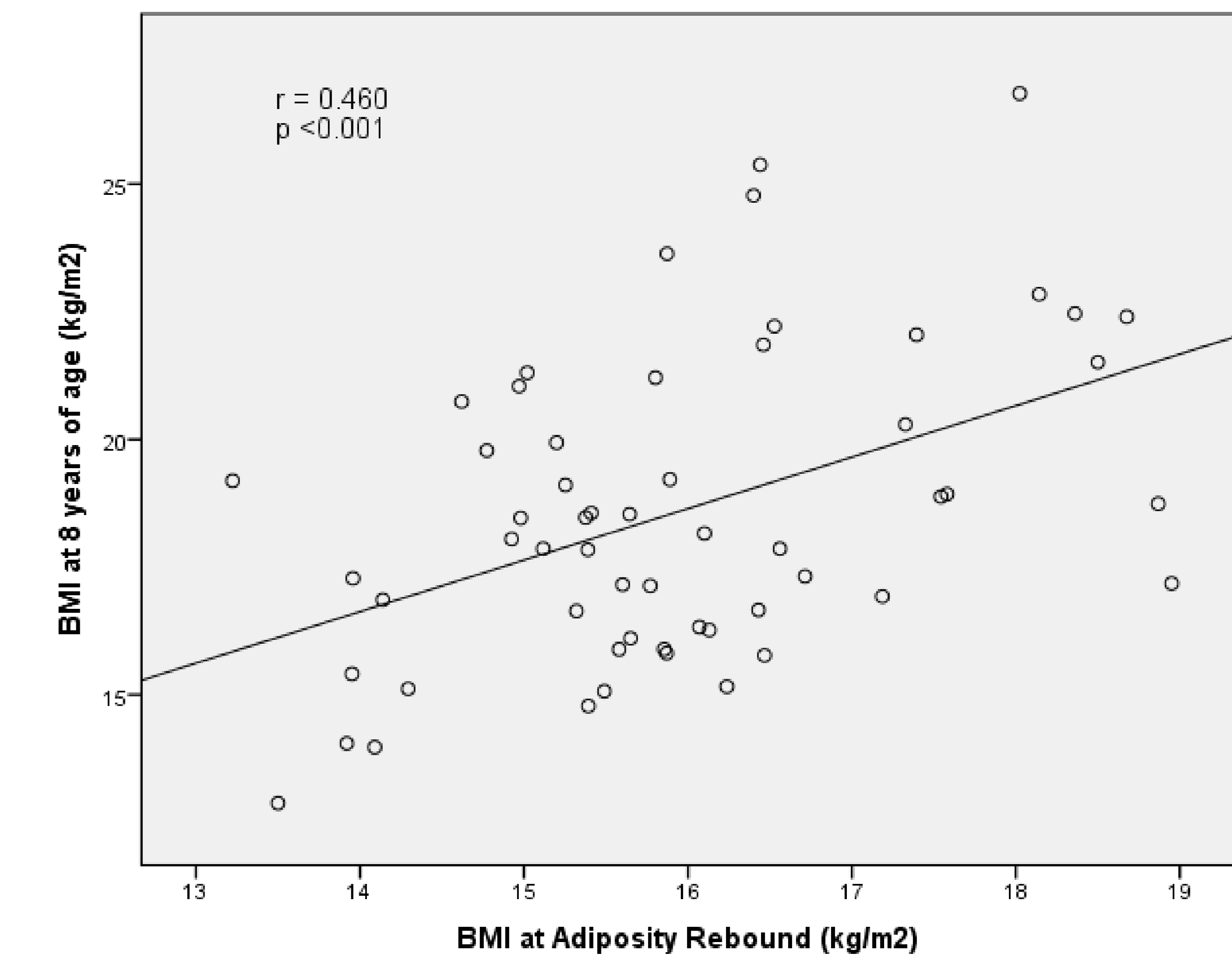
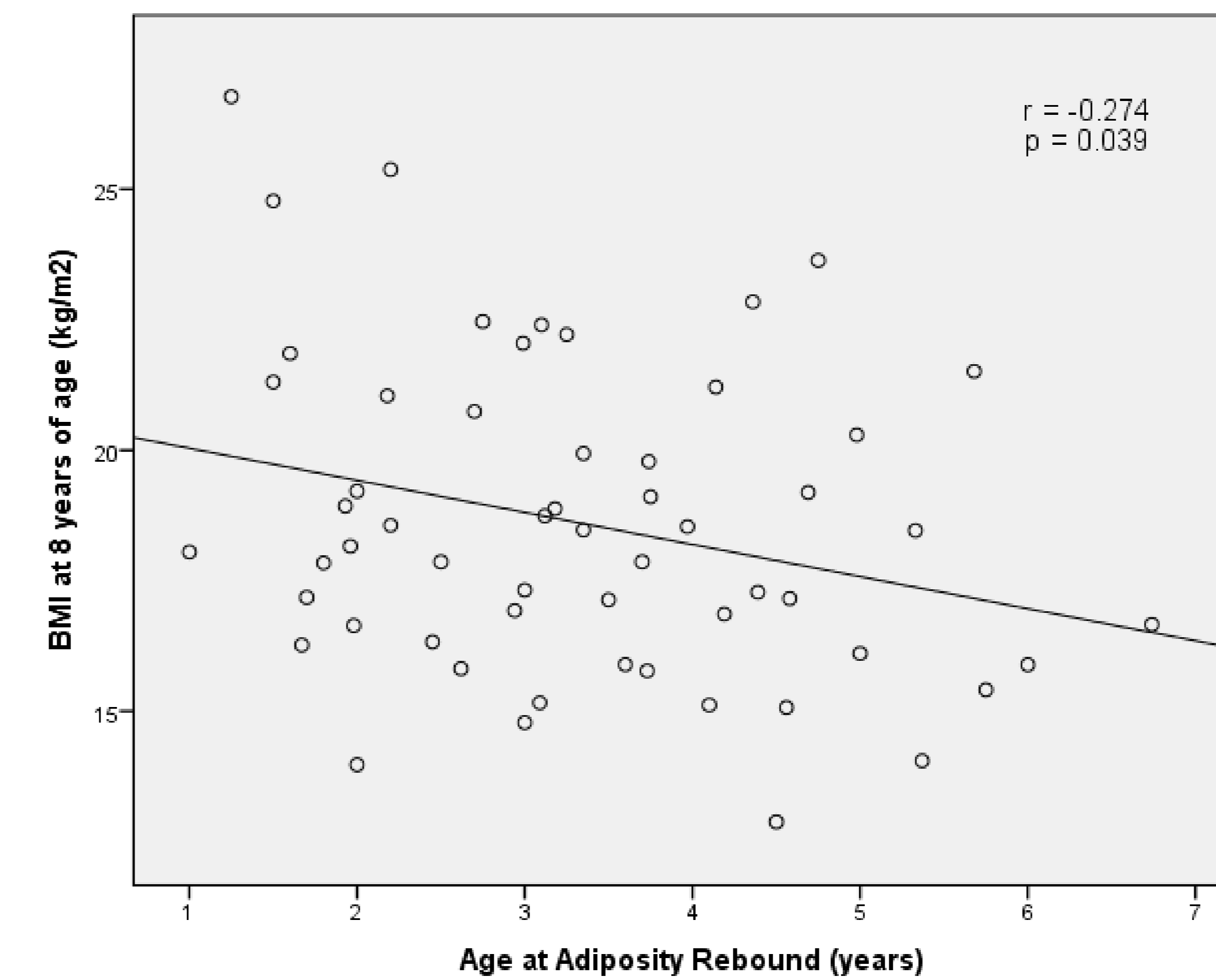
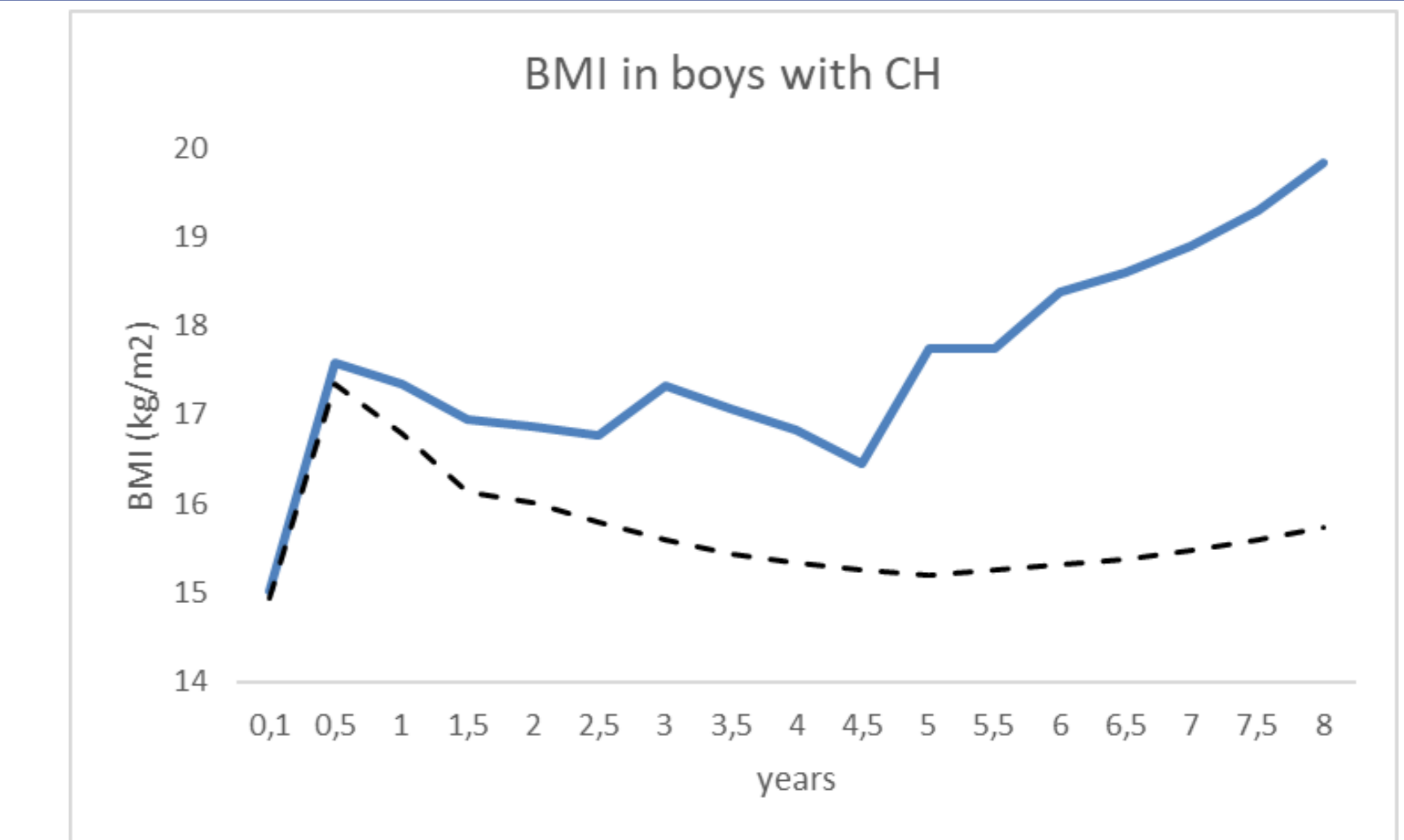
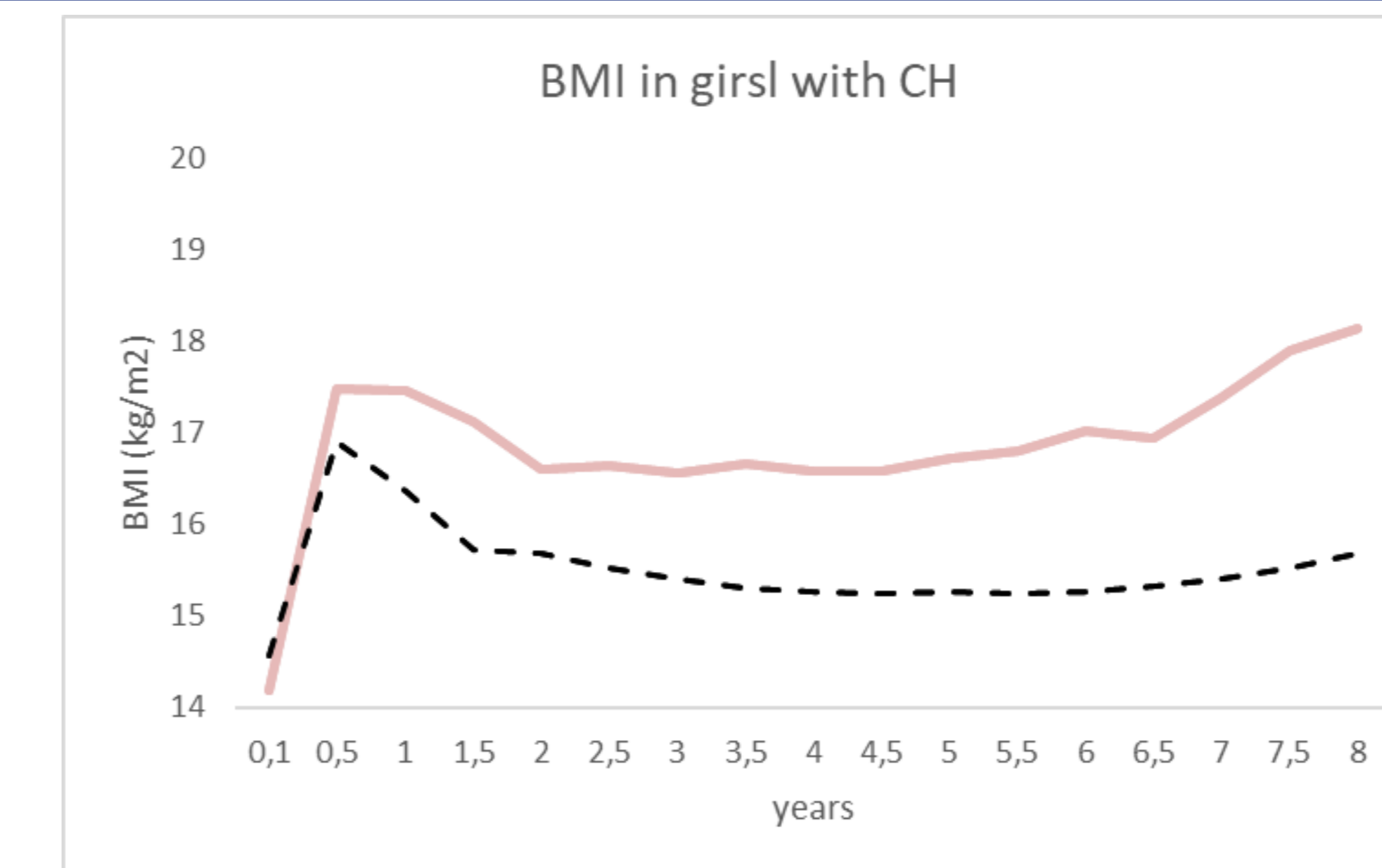
There were no significant relationships between timing of AR and initial thyroid function or initial levothyroxine dosage.

The prevalence of obesity/overweight at 8 years of age was 29%. BMI at AR was 16.69 ± 1.34 kg/m² in obesity/overweight subgroup and 15.63 ± 1.28 kg/m² in normal BMI subgroup ($p < 0.01$).

BMI at 8 years of age was 22.38 ± 1.84 kg/m² in obesity/overweight subgroup and 17.04 ± 1.68 kg/m² ($p < 0.001$).

Age at AR, BMI at AR, and BMI at 8 years of age were not different between the 47 patients with dysgenesis and the 22 with dyshormonogenesis.

	All	Normal weight at 8 years	Obese/overweight at 8 years	p	dysgenesis	dyshormonogenesis	p
n. of patients (percentage)	69 (100)	49 (71)	20 (29)		46 (67)	23 (33)	
Gestational age (weeks)	38.2 ± 2.4	38.8 ± 2.3	38.0 ± 2.5	0.249	38.6 ± 2.5	37.6 ± 2.2	0.105
Birth Weight (kg)	3.0 ± 0.6	3.1 ± 0.6	3.0 ± 0.5	0.663	3.0 ± 0.6	2.9 ± 0.6	0.511
Birth Length (cm)	47.8 ± 3.3	48.3 ± 3.3	48.3 ± 2.8	0.961	47.7 ± 3.4	48.1 ± 3.3	0.713
Age at CH diagnosis (years)	0.07 ± 0.03	0.07 ± 0.03	0.07 ± 0.02	0.150	0.06 ± 0.02	0.07 ± 0.03	0.922
TSH at CH diagnosis (mcrUI/ml)	321 ± 901	396 ± 1135	256 ± 386	0.568	455 ± 1099	78 ± 176	0.081
FT4 at CH diagnosis (pmol/l)	15.5 ± 10.8	19.4 ± 12.3	13.6 ± 8.4	0.136	16.7 ± 12.7	13.8 ± 7.4	0.401
Initial L-T4 treatment (mcr/kg/day)	9.2 ± 3.1	8.5 ± 3.1	10.2 ± 2.7	0.068	9.4 ± 2.7	8.7 ± 4.0	0.477
Age at AR (years)	3.4 ± 1.2	3.5 ± 1.3	3.1 ± 1.3	0.319	3.3 ± 1.3	3.5 ± 1.2	0.550
BMI at AR (kg/m ²)	15.9 ± 1.5	15.6 ± 1.3	16.7 ± 1.3	0.01	16.1 ± 1.6	15.6 ± 1.2	0.131
TSH at AR (mcrUI/ml)	2.8 ± 4.4	2.0 ± 2.2	4.5 ± 6.9	0.166	3.2 ± 4.9	2.3 ± 1.6	0.258
FT4 at AR (pmol/l)	20.7 ± 10.4	17.6 ± 14.0	17.3 ± 7.0	0.898	17.9 ± 13.3	17.1 ± 5.8	0.732
BMI at 8 years (kg/m ²)	18.6 ± 3.0	17.0 ± 1.7	22.4 ± 1.8	<0.001	18.7 ± 2.8	18.4 ± 3.5	0.765
TSH at 8 years (mcrUI/ml)	2.4 ± 1.7	2.5 ± 1.7	2.3 ± 1.6	0.704	2.4 ± 1.8	2.6 ± 1.2	0.651
FT4 at 8 years (pmol/l)	18.7 ± 4.3	18.7 ± 4.2	18.5 ± 4.8	0.872	19.5 ± 4.5	16.4 ± 2.9	0.003



CONCLUSIONS

Children with permanent CH showed significantly earlier AR compared to normal WHO references, which could predispose to obesity.

Prevalence of obesity/overweight at 8 years of age was 29% in our population with permanent CH.

Earlier AR was not related to the initial severity of hypothyroidism nor to the etiology of CH.

It is not yet clear which factors cause an early AR in patients with CH.