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Introduction:

Earlier menarche attainment has been associated with the increasing prevalence of overweight and obesity. The aim of the present study was to investigate the interrelationship between weight related anthropometric traits and the age at menarche in Norwegian girls.

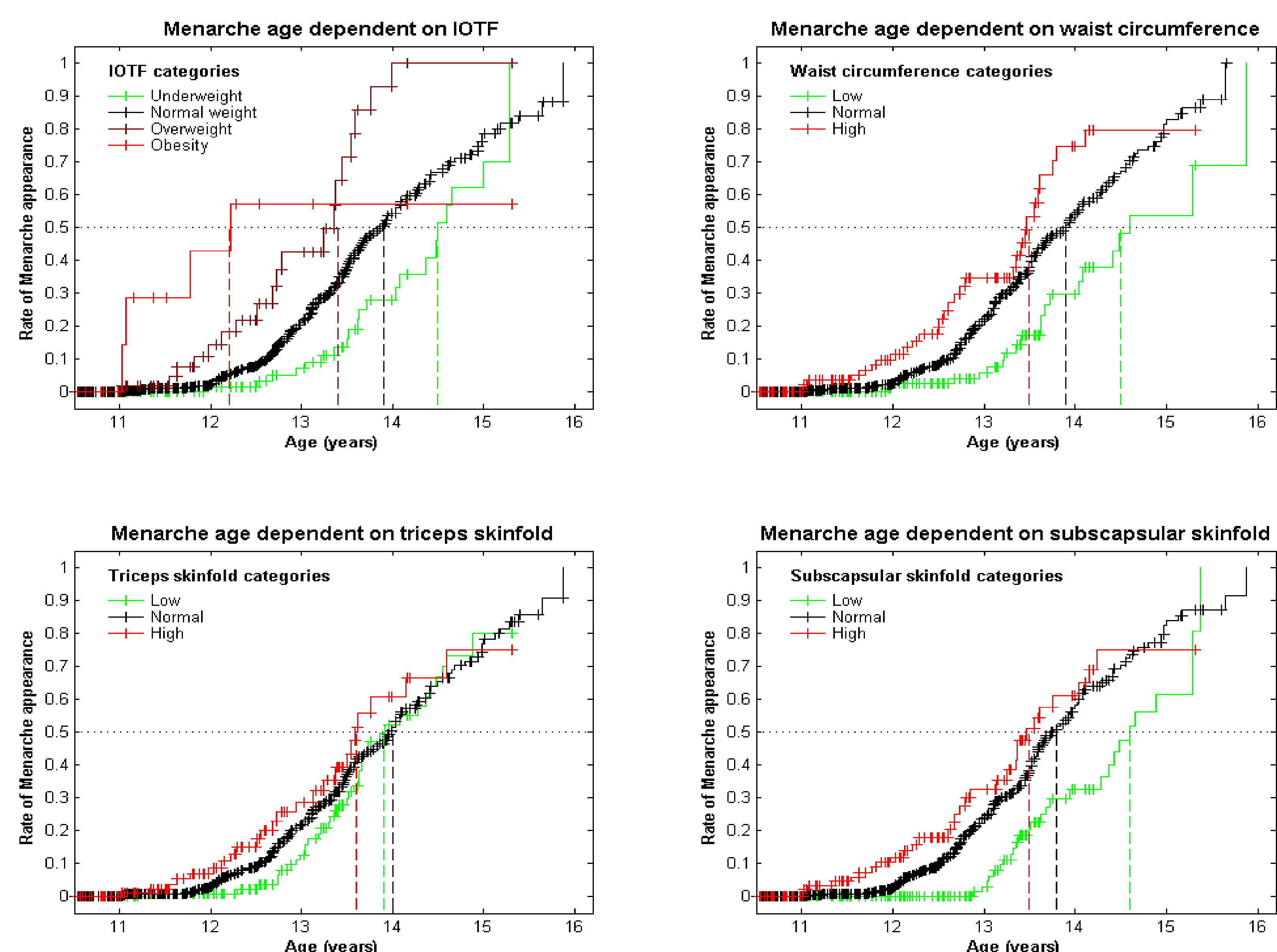
Material and methods:

The data were collected during 2003-06 in Bergen, Norway as part of The Bergen Growth Study. The original cohort contained 4061 girls. We excluded all girls with a reported menarche more than one year before the actual measurement. Kaplan-Meier analysis and Cox regression was used to analyse the correlations between age at menarche and BMI, skinfold thickness, waist circumference.

Results:

- The prevalence of overweight including obesity in girls of the study population was 14,5%, prevalence for obesity alone 2,3%.
- Of the 4061 girls enrolled, 858 reported to having experienced menarche. 189 girls reported menarche within one year at the time of measurement. A Kaplan-Meier showed a median age at menarche of 13.9 years (95%CI: 13.6, 14.1).
- Girls with overweight according to the IOTF criteria had menarche at a mean age of 13.4 years, those with obesity at mean age of 12.2 years.
- Analysis of subscapular skinfold thickness (SSF), triceps skinfold thickness (TSF) and waist circumference (WC) demonstrated similar negative correlations to the age at menarche, with SSF showing the strongest correlation (-0,376).
- The number of girls with overweight or obesity did not influence the mean age at menarche in the whole group compared to girls with normal BMI.

	N (events)	Unadjusted models		Fully adjusted model		Median menarche age (95% CI)
		HR	p-value	HR	p-value	
IOTF group	188		.000		.009	
Underweight	21	0.56 (0.35, 0.89)		0.97 (0.56, 1.68)		14.5 (14.2, 14.8)
Normal weight	144	1		1		13.9 (13.6, 14.1)
Overweight	19	3.09 (1.90, 5.05)		2.87 (1.49, 5.55)		13.4 (12.4, 14.3)
Obesity	4	1.40 (0.52, 3.80)		0.96 (0.25, 3.66)		12.2 (11.0, 13.4)
WC	189		.000		.045	
Low	20	0.44 (0.27, 0.71)		0.53 (0.29, 0.90)		14.5 (13.9, 15.3)
Normal	140	1		1		13.9 (13.6, 14.2)
High	29	1.55 (1.04, 2.33)		1.31 (0.72, 2.36)		13.5 (13.3, 13.7)
TSF	186		.363		.084	
Low	37	0.90 (0.62, 1.30)		1.47 (0.96, 2.23)		13.9 (13.3, 14.5)
Normal	125	1		1		14.0 (13.7, 14.2)
High	24	1.30 (0.84, 2.01)		0.67 (0.36, 1.26)		13.6 (13.4, 13.8)
SSF	189		.001		.019	
Low	26	0.48 (0.32, 0.74)		0.49 (0.30, 0.81)		14.6 (14.3, 14.9)
Normal	133	1		1		13.8 (13.5, 14.0)
High	30	1.28 (0.86, 1.90)		1.09 (0.60, 1.97)		13.5 (13.1, 13.8)



Conclusions:

The present study showed that age at menarche declines with increase in adiposity, as measured by BMI, SSF, TSF and WC. SSF was strongest correlated to menarche age. We could not observe any further secular trend of earlier menarche in the study group, and the contribution of the overweight and obese girls was to little to substantially change the overall menarche age.