

**Supplementary Table S11.** The literature data about associations of the studied polymorphisms with age at menarche and some menarche-related traits.

Chr	SNP	Gene/Region	Phenotype	Association (significance) (associated allele/genotype)	Reference
1	rs1514175	<i>TNNI3K</i>	Age at menarche <b>Body mass index</b> <b>Body mass index</b> Body mass index	-12.2 d ( $p=4.0 \times 10^{-7}$ ) (A) <b>0.07 kg/m<sup>2</sup> (<math>p=8 \times 10^{-14}</math>) (A)</b> <b>0.06 unit (<math>p=3 \times 10^{-11}</math>) (A)</b> 0.20 kg/m <sup>2</sup> ( $p=7.7 \times 10^{-4}$ ) (A)	[41] [44] [83] [84]
1	rs466639	<i>RXRG</i>	<b>Age at menarche</b> Body mass index Age at menarche <b>Age at menarche</b>	<b>-4.2 w (<math>p=1 \times 10^{-13}</math>) (T)</b> increasing ( $p=0.011$ ) (T) -4.1 w ( $p=0.023$ ) (T) <b>0.08 unit (<math>p=2 \times 10^{-24}</math>) (C)</b>	[34] [34] [85] [35]
1	rs7538038	<i>KISS1</i>	Age at menarche	-0.061 y ( $p_{\text{adj}}=0.012$ ) (G)	[53]
2	rs713586	<i>RBJ</i>	Age at menarche <b>Body mass index</b>	11.7 d ( $p=8.4 \times 10^{-7}$ ) (T) <b>0.14 kg/m<sup>2</sup> (<math>p=6 \times 10^{-22}</math>) (C)</b>	[41] [44]
2	rs2164808	<i>POMC</i>	Age at menarche	0.046 y ( $p_{\text{adj}}=0.038$ ) (T)	[53]
2	rs7589318	<i>POMC</i>	Age at menarche	0.048 y ( $p_{\text{adj}}=0.047$ ) (A)	[53]
2	rs4374421	<i>LHCGR</i>	Age at menarche	0.060 y ( $p_{\text{adj}}=0.017$ ) (C)	[53]
2	rs7579411	<i>LHCGR</i>	Age at menarche	0.058 y ( $p_{\text{adj}}=0.013$ ) (T)	[53]
2	rs4953616	<i>LHCGR</i>	Age at menarche	-0.065 y ( $p_{\text{adj}}=0.006$ ) (T)	[53]
2	rs6732220	<i>FSHR</i>	Age at menarche Age at menarche	0.17 y ( $p=0.0018, p_{\text{bonf}}>0.05$ ) (G) * 0.34 y ( $p=3 \times 10^{-5}$ ) epistasis	[86]
2	rs4953655	<i>FSHR</i>	Age at menarche Age at menarche	0.17 y ( $p=0.0023, p_{\text{bonf}}>0.05$ ) (G) * 0.34 y ( $p=3 \times 10^{-5}$ ) epistasis	[86]
2	rs12617311	<i>PLCL1</i>	<b>Age at menarche</b> Age at menarche	<b>-3.0 w (<math>p=6 \times 10^{-13}</math>) (A)</b> -4.7 w ( $p=0.004$ ) (A)	[34] [85]
3	rs6438424	<i>IGSF11</i>	<b>Age at menarche</b> Height adult Age at menarche Age at menarche	<b>-2.7 w (<math>p=1 \times 10^{-13}</math>) (A)</b> -0.013 Zscore ( $p=0.0004$ ) (A) -3.7 w ( $p=0.008$ ) (A)) 0.17 y ( $p_{\text{perm}}=0.005$ ) (A))	[34] [34] [85] [36]
4	rs2013573	<i>UGT2B4</i>	Age at menarche	0.060 y ( $p_{\text{adj}}=0.019$ ) (C)	[53]
4	rs13111134	<i>UGT2B4</i>	Age at menarche Age at menarche	0.055 y ( $p_{\text{adj}}=0.042$ ) (G) 0.431 y ( $p_{\text{bonf}}=0.044$ ) (A)	[53] [42]
4	rs222003	<i>GC</i>	Plasma levels of 25(OH)D and	( $p>0.05$ )	[87]

			1,25(OH) <sub>2</sub> D Compression strength index (male)	(p>0.05)	[88]
4	rs222020	GC	Plasma 25(OH)D concentrations Compression strength index (male)	(p=0.004) (p=0.0042)	[89] [88]
			Adolescent idiopathic scoliosis	(p<0.05)	[90]
4	rs3756261	EGF	Birth weight	lower (p<0.0001) (A) (4 snps haplotype)	[91]
5	rs757647	KDM3B	Age at menarche Age at menarche	<b>-2.4w(p=5.4x10<sup>-8</sup>,p<sub>bonf</sub>&gt;0.05)(A)*</b> -4.2 w (p=0.003) (A)	<b>[34]</b> [85]
6	rs7766109	F13A1	Body mass index, pressure insulin response, triglycerides, high density lipoprotein cholesterol in PCOS	(p=0.013) (p=0.015) (p=0.001) (p=0.012)	[92]
6	rs4946651	LIN28B	Age at menarche	<b>0.085 y (p= 3 x10<sup>-8</sup>) (A)</b>	[93]
6	rs7759938	LIN28B	Age at menarche Age at menarche Height adult Age at menarche Height Late pubertal growth Age at menarche Tanner stage Tanner stage (boys) Tanner stage (girls) Height adult Height adult Pubertal growth Age at menarche in PCOS	<b>0.09 y (p= 7 x10<sup>-9</sup>) (C)</b> <b>6.4 w (p= 5 x10<sup>-60</sup>) (C)</b> -0.042 Zscore (p=8.7 x10 <sup>-18</sup> ) (T) 8.3 w (p= 4 x10 <sup>-6</sup> ) (C) <b>-0.045 unit (p= 8 x10<sup>-31</sup>) (T)</b> <b>0.11 unit (p= 4 x10<sup>-9</sup>) (C)</b> <b>0.12 unit (p= 8 x10<sup>-110</sup>) (C)</b> -0.080 (p=3.42 x10 <sup>-8</sup> ) (C) -0.063 (p=0.012) (C) -0.088 (p=5.57 x10 <sup>-7</sup> ) (C) increasing (p=8.69 x10 <sup>-18</sup> ) (C) 0.042 cm (p= 2 x10 <sup>-6</sup> ) (C) (p=5x10 <sup>-11</sup> ) earlier (p=0.006) (T)	[94] <b>[34]</b> [34] [85] [95] [96] <b>[35]</b> [35] [35] [35] [35] [35] [97] [98] [99]
6	rs314280	LIN28B	Age at menarche Age at menarche Age at menarche (EA)	<b>0.086 y (p= 2 x10<sup>-8</sup>) (T)</b> <b>1.2 m (p=2 x10<sup>-14</sup>) (T)</b> 0.08 y (p=2 x10 <sup>-8</sup> ) (T)	[93] [100]

			Age at menarche (Asians)	0.13 y (p=0.0012) (T)	[101] [101]
6	rs314276	<i>LIN28B</i>	<b>Age at menarche</b> Height Breast development in girls Voice breaking Height growth in girls <b>Puberty onset</b>	<b>- 0.14 y (p= 4 x10<sup>-16</sup>) (C)</b> -0.37 cm (p=3.6 x10 <sup>-7</sup> ) (C) earlier (p = 0.001) earlier (p = 0.006) faster tempo (p= 0.00008) <b>0.08 unit (p= 2 x10<sup>-8</sup>) (C)</b>	<b>[66]</b> [66]     <b>[70]</b>
6	rs3020394	<i>ESR1</i>	Age at menarche Hip fractures	-0.12 y (p=0.0081, p <sub>bonf</sub> >0.05)(A)* OR=1.66 (p=0.0004)	[86] [102]
6	rs1884051	<i>ESR1</i>	Age at menarche Hip fractures Body weight, body mass index , waist-hip ratio, fat body mass, body fat percentage obesity in men Type 2 diabetes	-0.13 y (p=0.0035, p <sub>bonf</sub> >0.05)(A)* OR=1.46 (p=0.0004) lower (p = 0.007) (A), (p = 0.003) (A) , (p= 0.011) (A) , (p= 0.010) (A), (p= 0.040) (A), decreased (p=0.04) (A) (p=0.011)	[86] [102] [103]     [104]
6	rs7753051	<i>IGF2R</i>	Age at menarche Age at menarche Age at menarche	0.14 y (p=0.001, p <sub>bonf</sub> >0.05) (T) * 0.34 y (p= 3 x10 <sup>-5</sup> ) epistasis 0.500 y (p=0.046, p <sub>bonf</sub> >0.05)(A)*	[86] [86] [42]
7	rs1079866	<i>INHBA</i>	<b>Age at menarche</b> Height adult <b>Age at menarche</b> Tanner stage Tanner stage (girls) Height adult Age at menarche	<b>3.9 w (p=6 x10<sup>-14</sup>) (G)</b> -0.016 Zscore (p=0.015) (C) <b>0.07 unit (p=9 x10<sup>-24</sup>) (G )</b> -0.054 (p=0.005) (G) -0.058 (p=0.015) (G) increasing (p=0.015) (G) 0.13 y (p=0.037) (G)	<b>[34]</b> [34] <b>[35]</b> [35] [35] [35] [105]
8	rs2288696	<i>FGFR1</i>	Age at menarche	-0.058 y (p <sub>adj</sub> =0.033) (G)	[53]
9	rs10980926	<i>ZNF483</i>	<b>Age at menarche</b>	<b>2.5 w (p= 4 x10<sup>-11</sup>) ( A)</b>	<b>[34]</b>

			Height adult Age at menarche	-0.015 Zscore (p=0.0017) (G) 2.6 w (p= 0.047) ( A)	[34] [85]
9	rs10441737	<i>ZNF483</i>	<b>Age at menarche (EA)</b>	<b>-2.78 unit (p= 4 x10<sup>-15</sup>) (T)</b>	[106]
11	rs10769908	<i>STK33</i>	Age at menarche	9.6 d (p=7.8× 10 <sup>-5</sup> ) (T)	[41]
11	rs555621	<i>FSHB</i>	Age at menarche	0.059 y (p <sub>adj</sub> =0.0011) (C)	[53]
11	rs11031010	<i>FSHB</i>	Age at menarche PCOS	0.079 y (p <sub>adj</sub> =0.0037) (A) (p=4.27 × 10 <sup>-8</sup> )	[53] [107]
11	rs1782507	<i>FSHB</i>	Age at menarche	0.046 y (p <sub>adj</sub> =0.021) (T)	[53]
11	rs6589964	<i>BSX</i>	<b>Age at menarche</b> Height adult	<b>-2.7 w (p= 2 x10<sup>-12</sup>) (A)</b> -0.014 Zscore (p=0.0025) (A)	<b>[34]</b> [34]
12	rs1544410	<i>VDR</i>	Vitamin D deficiency in children Vitamin D vs testosterone level, free androgen index in women 23% of the variation in serum 25- hydroxyvitamin D concentrations in children Testosterone level and free androgen index in women Osteoporosis Bone mineral density at the lumbar spine in girls with adolescent idiopathic scoliosis Adolescent idiopathic scoliosis	OR=2.33 (p=0.041) (G) (p<0.05)  (p<0.05)  p<0.002  OR=0.61-0.70 (p<0.05) lower levels (p<0.05) (TT)  (p<0.05)	[108] [109]  [110]   [109] [111] [112]  [90]
14	rs999460	<i>NKX2-1</i>	Age at menarche	0.046 y (p <sub>adj</sub> =0.039) (A)	[53]
14	rs4986938	<i>ESR2</i>	Age at menarche	-7.0 m (p=0.005) (G)	[113]
15	rs2241423	<i>MAP2K5</i>	Age at menarche <b>Body mass index</b> Obesity Body mass index Children obesity	13.1 d (p=6.1× 10 <sup>-6</sup> ) (A) <b>0.13 kg/m<sup>2</sup> (p= 1 x10<sup>-18</sup>) (G)</b> OR = 0.79 (p= 0.029) (A) -0.092 unit (p = 0.028) (A) (p<0.005)	[41] <b>[44]</b> [114] [114]

			Obesity Adulthood body mass index Body mass index	OR=1.34 (0.001) (G) (p<0.05) 0.11 kg/m <sup>2</sup> (p=0.028) (G)	[115] [90] [116] [84]
16	rs12444979	<i>GPRC5B</i>	Age at menarche <b>Body mass index</b> Body mass index Body mass index (EA) Body fat mass (EA)	13.5 d (p=2.6× 10 <sup>-4</sup> ) (T) <b>0.17 kg/m<sup>2</sup> (p=3 ×10<sup>-21</sup>) (C)</b> (p<0.05) (p=0.014) (p=0.002)	[41] <b>[44]</b> [46] [45] [45]
16	rs9939609	<i>FTO</i>	<b>Age at menarche</b> Body mass index <b>Body mass index</b> <b>Body mass index</b> <b>Obesity</b> Obesity Obesity Obesity Obesity Body mass index Extreme obesity	<b>-2.1 w (p= 3 ×10<sup>-8</sup>) (A)</b> increasing (p= 6.3 ×10 <sup>-17</sup> ) (A) <b>0.33 kg/m<sup>2</sup> (p= 4 ×10<sup>-51</sup>) (A)</b> <b>0.36 kg/m<sup>2</sup> (p= 3 ×10<sup>-35</sup>) (A)</b> <b>OR=1.25 (p= 1 ×10<sup>-20</sup>) (A)</b> OR=9.86 (p=0.026) (AA) OR=2.03 (p=0.002) (AA) OR=1.72 (p=0.009) (AA) OR = 1.39 (p < 0.01) (A) increasing (p=0.0059) (A) OR=1.46 (p=1.42 ×10 <sup>-11</sup> ) (A)	<b>[34]</b> [34] [117] [118] [119] [120] [121] [122] [123] [124] [125]
16	rs12324955	<i>FTO</i>	Age at menarche	-0.15 y (p=0.0057, p <sub>bonf</sub> >0.05)(A)*	[86]
18	rs1398217	<i>SKOR2</i>	<b>Age at menarche</b>	<b>-2.7 w (p= 2 ×10<sup>-13</sup>) (G)</b>	<b>[34]</b>
19	rs2252673	<i>INSR</i>	PCOS PCOS	OR=1.32 (p=0.006) (G) (p<0.05)	[126] [127]
20	rs1073768	<i>GHRH</i>	Age at menarche	-0.046 y (p <sub>adj</sub> =0.045) (C)	[53]
22	rs4633	<i>COMT</i>	Age at menarche	0.13 y (p=0.0097, p <sub>bonf</sub> >0.05) (T) *	[86]
X	rs5930973	<i>CD40LG</i>	Age at menarche	0.101 y (p <sub>adj</sub> =0.0067) (A)	[53]

X	rs3092921	<i>CD40LG</i>	Age at menarche	0.074 y ( $p_{\text{adj}}=0.037$ ) (C)	[53]
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*Note:* The data from the GWAS are highlighted in bold.

\* putative candidate loci age at menarche (crude  $p < 0.05$ , corrected for multiple comparisons  $p_{\text{bonf}} > 0.05$ ).