

FACTORS INFLUENCING THE AGE AT MENARCHE

By

J. K. GROVER, K. RAMACHANDRAN AND V. L. BHARGAVA

Introduction

It is observed that the age at menarche in the developing countries has gradually declined. Various factors which could influence the age at menarche have been studied. Frisch and Ravell (1970) proposed that menarche is related to the attainment of a critical body weight (body fat) independent of height. Heavy girls experience menarche earlier than the light girls of a similar height. The mean weight at menarche as observed by Frisch and Ravell (1971) is 47.8 ± 0.51 kg regardless of height. Present study has been undertaken to find out whether the same weight standards as in Western countries are applicable to the Indian girls.

Material and Methods

A survey was carried out in 37 schools of which 23 were Govt., 11 Govt. aided, and 3 private, where girls from different social strata studied. Of these one was Bengali, one Kannad, one Tamil and one Khalsa school where girls predominantly came from the corresponding states. The sample consisted of 6772 girls. Girls' age was noted from the school records. She was also asked about the socio-economic status, her dietetic habits whether she was vegetarian or non-vegetarian and the

state to which she belonged. Special enquiry was made regarding the age at the onset of menarche, age at the appearance of pelvic and axillary hair and the development of breasts. Any girl with a systemic disease or endocrine disorder was excluded from the study. Five girls in whom the date of birth was not certain were also excluded from the study. Each girl had weight, height and chest measurements taken.

Results

The age of 6772 girls varied from 9-20 years (Table I). Of these 995 had attained menarche. The average age at menarche was found to be 151.49 mths $\pm .0044$ SEM. The average body weight at menarche was found to be 41.89 kg $\pm .007$ SEM which is much lower than that seen in American population (47.8 ± 0.5). The least body weight at which menarche occurred in our girls was found to be 22.5 kg. Fifteen girls had weight ranging between 22.5 to 30 kgs (Fig. 1).

Non-vegetarian girls had significantly earlier menarche. There were 1889 vegetarian girls, of these 10.6% had attained menarche. Nature of diet did not influence the height, weight and chest measurements (Table II & III). Axillary hair development had not occurred in 80 girls and pelvic hair had not developed in 35 girls. The mean height-weight difference in the 2 groups was not found significant.

From: All India Institute of Medical Sciences, Ansari Nagar, New Delhi-110 029.

Accepted for publication on 31-2-87.

TABLE I
Age Distribution in 6772 Girls

Age in years (No.)	10	11	12	13	14	15	16	17	18	19	20
Total	26	915	2070	1229	469	159	67	21	12	4	1
No. of girls Pre. Menarche	28	114	1793	892	277	79	34	7	6	0	0
No. of girls Post Menarche	Nil	1	277	337	192	80	33	14	6	4	1
% of girls who have attained menarche	0	1%	13.38%	27.42%	40.94%	50.3%	49.25%	66.67%	50%	100%	100%

TABLE II
Mean Height in Different Age Groups

Age in years (No.)	9	10	11	12	13	14	15	16	17	18	19	20
Before Menarche No. of girls	(28)	(914)	(1747)	(1793)	(892)	(277)	(79)	(34)	(6)	(6)		
Mean Height in cms	136.68	137.52	141.33	145.57	148.09	148.93	148.24	150.38	149.71	150.33	—	—
S.D.	9.22	7.68	7.67	7.24	7.09	7.58	4.43	6.28	4.19	2.88	—	—
SEM	1.74	0.25	0.18	0.17	0.24	0.46	0.50	1.08	1.55	1.17	—	—
After Menarche No. of girls	1	50	277	337	192	80	33	14	6	64	4	1
Mean height in cms	—	154.0	150.61	152.10	152.66	151.51	150.76	150.88	150.81	148.62	143.92	130.00
S.D.	—	0.0	7.36	5.08	5.96	5.46	6.46	5.73	6.63	5.19	6.93	—
SEM	—	0.0	1.04	0.31	0.32	0.39	0.72	1.00	1.77	2.12	3.46	—

TABLE III
Chest Measurements in Different Age Groups

Age in years (No. of girls)	9 (24)	10 (914)	11 (1714)	12 (1768)	13 (890)	14 (277)	15 (46)	16 (21)	17 (17)	18 (6)	19	20
Mean chest measurement in inches	26.08	26.44	27.44	28.42	29.20	29.66	29.95	29.95	30.0	31.08	—	—
S.D.	2.08	2.30	2.56	2.64	2.52	2.58	1.98	1.79	1.66	1.53	—	—
S.E.M.	0.43	0.08	0.06	0.06	0.08	0.15	0.29	0.39	0.63	0.62	—	—
After menarche No. of girls	—	1	50	277	337	192	80	33	14	6	4	1
Mean	—	30.0	30.63	31.64	31.73	31.31	31.02	31.61	30.96	29.17	31.25	31.0
S.D.	—	0.0	2.73	2.39	2.67	2.13	0.24	2.42	2.41	1.60	0.29	0.0
S.E.M.	—	0.0	0.39	0.14	0.15	0.15	0.25	0.42	0.64	0.65	0.14	0.0

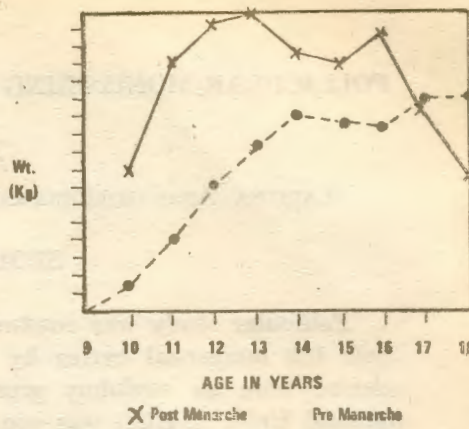


Fig. 1
Mean body wt. in kg for each year in pre and post menarche population.

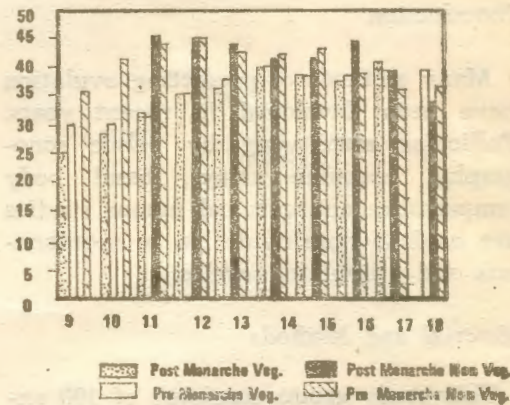


FIG. 2.
Relationship of the type of diet to the age of onset at menarche.

In view of the 22.5 kg being the least weight at menarche a study is yet to define the minimum weight beyond which disturbance in menstruation would occur in Indian population.

References

1. Frisch, R. E. and Revella, R.: Science, 169: 397, 1970.
2. Frisch, R. E. and Revella, R.: Arch. Dis Child, 46, 695, 1971.