

Genetic and Socio-Economic Influence on Menarche

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ABSTRACT For assessing the role of genetics and socio-economic environment on age at menarche, duration of menstrual flow and menstrual cycle, the present study has been conducted on 100 mothers and their 134 daughters who have already experienced menarche. The menarcheal age of individuals was recorded following retrospective method of Boston and Bentzon (1971) and was converted into decimals using decimal calendar provided by Weiner and Lourie (1969). Maximum number of mothers (25 per cent) has age at menarche ranging between 13.5 to 14.5 years. Maximum number of daughters (30.59 per cent) had age at menarche between 12.5 to 13.5 years. Mothers are showing a higher mean age at menarche (13.871 years) as compared to their daughters (13.316 years). The value of coefficient of correlation calculated for mothers and their daughters is 0.095 indicating almost no relation between age at menarche of the mothers and their daughters. Duration of menstrual flow in majority of mothers (28 per cent) and their daughters (38.08 per cent) ranges from 3-4 days. Menstrual cycle in majority of mothers and daughters (64.00 and 64.18 per cent) ranged between 25-30 days.

According to Tanner (1963) there is a fairly high correlation between the ages of menarche of mothers and daughters and between sisters and a very much higher one between identical twins. He also observed that a better environment (socio-economic) allows the genes to demonstrate potentialities that are still unrealized.

For assessing the role of genetics as well as environment on age at menarche, duration of menstrual flow and menstrual cycle, the present study has been conducted on mothers and their natural daughters (the study excludes adopted daughters) who had already achieved this milestone at the time of investigation.

MATERIAL AND METHODS

The present study has been conducted in Patiala (Panjab) on 100 mothers and their 134 daughters who had already experienced menarche. The age of the mothers ranged between 31.490 to 55.592 years and the daughters were between 11.436 to 28.101 years of age.

SAMPLE SIZE

Age groups (in years)	Number of mothers	Age groups (in years)	Number of daughters
30-35	5	10-15	21 (15.67)
35-40	25	15-20	69 (51.49)
40-45	43	20-25	39 (28.36)
45-50	21	25-30	6 (4.48)
50-55 or more	6		
Total	100		134

Figures in parentheses show percentage

Detailed information was also collected from the subjects regarding their socio-economic status including their income, education, birth order and dietary habits for observing the possible influence of these factors on age at menarche, menstrual flow and menstrual cycle.

The menarcheal age of the individuals was recorded following retrospective method of Boston and Bentzon (1971) and was converted into decimals using decimal calendar of Weiner and Lourie (1969).

The correlations have been calculated by applying the product moment coefficient of

Table 1: Per capita income and age at menarche of mothers and their daughters

Income per capita Rupees	Number		Mean age at menarche		Mean age at menarche of daughter
	Mother	Daughters	Mother	Daughter	
300 - 600	23	31 (23.15)	14.529	13.458	
600 - 900	25	32 (23.88)	13.455	13.330	
900 - 1200	28	41 (30.59)	14.012	13.360	
1200 - 1500	15	20 (14.93)	13.014	13.234	13.345
1500 - 1800	6	6 (4.48)	14.226	12.840	
1800 - 2100	1	2 (1.49)	15.780	11.992	
2100 - 2400	1	1 (0.74)	15.006	13.189	12.748
2400 - 2700	1	1 (0.74)	12.866	12.970	
Total	100	134	13.871	13.316	

correlation, and the formula used for the calculation is:

$$r_{xy} = \frac{\sum xy - \frac{1}{n}(\sum x)(\sum y)}{\sqrt{\left(\sum x^2 - \frac{(\sum x)^2}{N}\right)\left(\sum y^2 - \frac{(\sum y)^2}{N}\right)}}$$

Where N is the total number of families, x and y are the two variables where x stands for the menarcheal age of mother and y for the daughter and the value of x has been repeated in the case of mother having more than one daughter.

OBSERVATIONS AND DISCUSSION

Socio-economic Factors

The information collected on socio-economic parameters including per capita income, educational status, birth order and dietary habits of mothers and daughters indicates that the factors like educational status and birth order have no bearing on the menstrual pattern. The daughters belonging to higher per capita income groups (Table 1) are showing a low age at menarche (12.748 years) as compared to low per capita income groups (13.345 years). The results get support from the findings of Chang et al. (1967); Shrivastava and Goswami, (1968); Chattopadhyay and Khuller (1969); Malhotra, (1974) and Singh and Malhotra (1988). In the

present study non-vegetarian mothers are showing a low mean age at menarche (13.671 years) as compared to vegetarian mothers (14.088 years). This has also been observed by Kralj (1956); Damon et al. (1969); Kaur (1973); Malhotra (1974) and Sethi (1975) who have observed that nutritious diet results in early menarche. However, the daughters in the present study are showing results which are in contradiction to this observation (Table 2).

Menarcheal History

Table 3 depicts data on 100 mothers and their 134 daughters grouped into ten categories on the basis of their age at menarche.

Majority of mothers (25 per cent) and daughters (23.13 per cent) experienced menarche between 13.5 to 14.5 years wherever least number of mothers (one per cent) and of

Table 2: Dietary habits and age at menarche of mothers and their daughters

Dietary habits	Number		Mean age at menarche in yrs	
	Mothers	Daughters	Mothers	Daughters
Vegetarian	48	62 (46.26)	14.088	13.301
Non-vegetarian	52	72 (53.74)	13.671	13.643
Total	100	134	13.871	13.316

Table 3: Age at menarche in mothers and daughters

Age group (in years)	Number		Mean age at menarche (yrs)	
	Mothers	Daughters	Mothers	Daughters
8.500 - 9.500	2	3 (2.24)	8.671	11.264
9.500 - 10.500	1	1 (0.74)	10.000	13.156
10.500 - 11.500	6	9 (6.72)	11.089	13.090
11.500 - 12.500	10	14 (10.15)	11.888	13.136
12.500 - 13.500	21	27 (20.15)	13.042	13.136
13.500 - 14.500	25	31 (23.13)	14.030	12.973
14.500 - 15.500	12	17 (12.68)	14.977	14.043
15.500 - 16.500	18	22 (16.42)	15.809	12.870
16.500 - 17.500	4	8 (5.97)	16.882	13.621
17.500 or more	1	2 (1.49)	17.534	13.803
Total	100	134	13.871	13.316

Table 4: Age at menarche in mothers and their daughters

Mothers Total No.	in years	Daughters										Total No.
		8.5- 9.5	9.5- 10.5	10.5- 11.5	11.5- 12.5	12.5- 13.5	13.5- 14.5	14.5- 15.5	15.5- 16.5	16.5- 17.5	17.5- or more	
2	8.5-9.5		1 (33.33)	1 (33.33)	1 (33.33)							3
1	9.5-10.5					1 (100)						1
6	10.5-11.5		1 (11.11)	1 (11.11)	2 (22.22)	2 (22.22)		3 (33.33)				9
10	12.5-12.5			2 (14.28)	2 (14.28)	6 (42.85)	2 (14.28)	2 (14.28)				14
21	12.5-13.5			1 (3.70)	4 (14.18)	7 (25.92)	5 (18.51)	8 (29.62)	2 (7.41)			27
25	13.5-14.5		1 (3.22)	3 (9.67)	8 (25.80)	8 (25.80)	10 (32.25)			1 (3.22)		31
12	14.5-15.5				2 (11.76)	6 (35.29)	3 (17.64)	4 (23.52)	2 (11.76)			17
18	15.5-16.5		1 (4.54)	1 (4.54)	6 (27.27)	7 (31.81)	7 (31.81)					22
4	16.5-17.5					3 (37.50)	4 (50.00)	1 (12.50)				8
1	17.5 or more					1 (50.00)	1 (50.00)					2
100	Total No. of daughters		4 (2.98)	9 (6.71)	25 (18.66)	41 (30.59)	32 (23.88)	18 (13.44)	4 (2.99)	1 (0.74)		134

Mean of x (age at menarche of mothers) = 13.922684962

Standard Deviation of x = 1.732050807

S.E. of S.D. of x = 0.150187852

Correlation coefficient, $r = 0.095455673$

Mean of y (age at menarche of daughters) = 13.816706766

Standard Deviation of y = 1.414213562

S.E. of S.D. of y = 0.122627863

Table 5: Duration of menstrual flow in mothers and their daughters

Total No. of mothers	Days	Daughters							Total No. of daughters
		2-3	3-4	4-5	5-6	6-7	7-8	8-9	
24	2-3	6 (18.75)	13 (40.62)	9 (28.12)	2 (6.25)	1 (3.12)	—	1 (3.12)	32
28	3-4	7 (18.42)	17 (44.73)	10 (20.63)	1 (2.63)	1 (2.63)	1 (2.63)	1 (2.63)	33
24	4-5	2 (6.45)	13 (41.93)	14 (45.16)	2 (6.45)	—	—	—	31
9	5-6	—	4 (40.00)	5 (50.00)	—	—	1 (10.06)	—	10
9	6-7	1 (7.69)	2 (15.38)	6 (46.15)	2 (15.38)	—	2 (15.38)	—	13
3	7-8	—	1 (33.33)	1 (33.33)	1 (33.33)	—	—	—	3
1	8-9	1 (25.00)	1 (25.00)	2 (50.00)	—	—	—	—	4
2	9-10	—	—	1 (33.34)	2 (66.67)	—	—	—	3
100	Total No. of daughters	17 (12.68)	51 (38.08)	48 (35.82)	10 (7.46)	2 (1.49)	4 (2.98)	2 (1.49)	134

Table 6: Menstrual cycle in mothers and daughters

Mothers	In days	Daughters					Total No.
		20-25	25-30	30-35	35-40	Irregular	
25	20-25	7 (21.87)	20 (62.50)	2 (6.25)	—	3 (9.37)	32
64	25-30	4 (4.54)	61 (69.32)	15 (17.04)	1 (1.13)	7 (7.95)	88
3	30-35	—	3 (75.00)	1 (25.00)	—	—	4
2	35-40	—	—	2 (100.00)	—	—	2
6	Irregular	—	2 (25.00)	2 (25.00)	—	4 (50.00)	8
100	Total No. of daughters	11 (8.21)	86 (64.18)	22 (16.41)	1 (0.74)	14 (10.44)	134

daughters (0.74 per cent) had their age at menarche on 17.5 or more and 9.5 to 10.5 years, respectively. The mothers are showing a higher mean age at menarche (13.871 year) as compared to daughters (13.316 years).

The distribution of age at menarche in mothers and their daughters (Table 4) is not showing definite trend and the value of correla-

tion coefficient is also indicating almost no relation between age at menarche of mothers and their daughters ($r = 0.0955$), whereas results of Gould and Gould (1932); Raymert and Jost (1947); Tanner (1964); Kantero and Widholm (1971) and Rizvi and Fatma (1984) show a positive correlation between age at menarche of mother and daughters.

Maximum number of mothers and daughters (28 per cent and 38.08 per cent, respectively) had menstrual flow ranging between 3-4 days, closely followed by 24 per cent mothers and 35.82 per cent daughters in 4-5 days category (Table 5). As is also evident from table 5, majority of the daughters are showing a similar duration of flow as that of their mothers. The present study results confirm the findings of Rizvi and Fatma (1984) that the distribution of daughters' menstrual flow is according to that of their mothers.

Majority of mothers (64 per cent) and daughters (64.18 per cent) had menstrual cycle ranging between 25-30 days (Table 6). It is also depicted from the table that in each category majority of the daughters have a tendency to show a similar menstrual cycle as those of their mothers. These results are also confirming the findings of Rizvi and Fatma (1984).

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