Chapter – 5

SUMMARY AND CONCLUSION
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The present study was conducted in Aligarh city, between October 2005 to October 2006 with an objective to know the mean age at menarche and its’ associated correlates.

Adolescent girls of 4 senior secondary schools in the age group 10-15 years were included in the study. A total of 700 adolescent students were selected out of which 400 (57.2%) girls had attained their menarche and 300 (42.8%) were non menarcheal. A detailed personal and family history, specially age of the girl, her age at menarche, mother’s age at menarche was enquired into. Each girl was then subjected to a thorough physical examination with emphasis on anthropometric measures and Sexual Maturity Rating (SMR) stages. Each selected girl during a regular classroom hour was asked to fill in a preformed and modified questionnaire including the above mentioned details.

For the assessment of nutritional status in the present study Body Mass Index (or Quetlet Index) was calculated (Kg/m^2). The values of BMI given by ICMR were used to classify adolescents into underweight (BMI<Kg/m^2), normal (BMI 18-12 <g/m^2) overweight (BMI 25-30 kg/m^2) and obese (BMI >30kg/m^2). A significantly high proportion of menarcheal girls were found underweight, only 5 girls were overweight and none of the subjects was found obese. Height and weight were analyzed and compared with ICMR norms (Aggarwal et al, 1992) and NCHS standards (2004). It was observed that girls who had attained menarche after the mean age (late
matures) had weight below the expected weights at the respective ages, while the early matures had weights above the expected values. On the other hand the mean weight of non menarcheal girls was found less than the expected values at all ages except 10 years. There was no significant difference found in the height of menarcheal and non-menarcheal girls of same age.

A 24 hour dietary recall method of the previous day was utilized for the purpose of getting the dietary intake as this method is more likely to produce a reliable estimate of intake where a regular meal pattern is followed. Total intake of calories, proteins and iron was calculated on that basis. The differences between the calorie, protein and iron intakes of menarcheal and non-menarcheal girls was found to be statistically significant. Among the menarcheal girls, a significantly high proportion of girls (66%) had low calories intakes (Below average). Only 22.7% girls took proper calories. Mean intake of all nutrients among the early matures was significantly higher than the mean intake of late matures as well as the intakes of non menarcheal girls of same age. The mean intakes of iron fall short of ICMR standards irrespective of age and menarcheal status.

The pubertal growth was assessed by means of Tanners (1976) stages of sexual Maturity rating (SMR). Majority of the menarcheal girls were found in the SMR stage III or IV, whereas the non menarcheal girls were found between stages I and III.

For assessing the socioeconomic status (SES). B.G. Prasad method of socioeconomic classification (modified as per 2002) was used. The difference between the mean SES of menarcheal and non menarcheal girls was found to be statistically insignificant.
For assessing the presence of anemia, clinical examination was done and the girls were noted for the presence of pallor. A significant proportion of the selected girls, 31.8%, were found with mild anemia and 11% girls were moderately anemic. None of the girls were found with severe degrees of iron deficiency and 57.2% girls were free from any degree of anemia.

In the present study the maximum percentage of girls (28.3%) attained menarche at the mean age of 13.3 years. The percentage drops gradually as the mean age of attaining menarche decreased with minimum percentage of girls (2%) attaining menarche at the mean age of 9.9 years. The overall mean menarcheal age in the present study was found to be 12.36 ± 1.16 years. The literature reviewed showed wide ranging variation in the mean menarcheal age, both in India and Abroad. However the present finding compared well with most of the North Indian studies especially to a multi center ICMR (1992) study and NFI (1989) study.

On analyzing the various problems faced at the time of menarche and afterwards, it was found that age at menarche was strongly correlated with the presence of amenorrhea and pre-menstrual symptoms (PMS). On the other hand, presence of painful menstrual periods (dysmenorrhea) and Dysfunctional uterine bleeding were not affected by age at menarche.

Among the various variables studied the factors most significantly associated with age at menarche were religion, fathers literacy level and occupation, BMI, mode of feeding in infancy, eating habits and dietary intake of calories and protein, anemia and heredity.

Hence, from the present study, the following conclusion could be drawn:
1. Age at menarche was strongly correlated with religion. The maximum % age of early menarcheal girls (77.6%) found among Muslim, and maximum % age of late menarcheal girls (64.5%) were found among Hindus.

2. Age at menarche was positively correlated with father’s literacy level and occupation.

3. No significant difference was found between menarcheal and non menarcheal girls according to mother’s education and working status.

4. SES was also significantly associated with age at menarche. The number of girls in early maturing population increased with rising income group.

5. The mean weights of both groups was found less than expected weights at all ages except for 10 years of age.

6. Early menarcheal girls (9.5 – 11.5 years) showed maximum mean body weight of 43.5 kg; 1.5 kg more than mean weight of normal menarcheal girls (11.6 – 13.5 years). Late matures showed minimum mean body weight of 39.7 kg, approximately 4 kg less than the weight of early matures.

7. The mean BMI of menarcheal girls was found higher than the mean BMI of non menarcheal girls of same age.

8. 48% menarcheal girls were found underweight as compared to 78% among non-menarcheal girls. 50.7% menarcheal girls were found with normal BMI as against only 22% non-menarcheal girls.
9. The prevalence of over weight was found to be 1.25% among menarcheal girls only. None of the subjects was found obese.

10. The percentage of bottle-fed girls was highest among early matures (72.8%), whereas the percentage of breast-fed girls was highest among late matures (75.8%) as compared to early matures (27.1%)

11. The percentage of non-vegetarian girls was high (16%) among early matures as compared to only 2.7% vegetarian.

12. Mean calories intake of menarcheal girls was found significantly higher than mean intake of non-menarcheal counterparts.

13. Among 400 menarcheal girls, only 22.8% took appropriate calories. 8.7% girls had above average calorie intake which constituted early menarcheal population.

14. Only 15.8% menarcheal girls took average protein in their diets. Very low %age (7.5%) of girls took average iron. The mean intakes of iron fall short of ICMR standards irrespective of age and menarcheal status.

15. The mean Blood pressure of menarcheal girls was found significantly higher than the mean B.P. of non menarcheal girl at same age.

16. The number of girls experiencing anemia was found gradually increasing with increasing age of menarche.

17. Out of 700 girls the prevalence of anemia was found to be 19.3% among menarcheal girls as compared to 23.5% non-menarcheal girls.

18. Maximum numbers of menarcheal girls were found in SMR III or IV.
19. The mean age of attaining menarche in the present study was found to be 12.36 ± 1.16 years.

20. Early matures experienced more PMS (53.4%) as compared to normal and late matures (34.5% and 38.7% respectively).

21. No significant correlation was found between BMI and PMS(s).

22. Among 400 menarcheal girls, the prevalence of amenorrhea was found to be 45.6% among early matures, 28.5% among normal matures and 8.06% among late matures.

23. A significantly high percentage of non-vegetarian girls (16.5%) experienced amenorrhea as against only 6.8% vegetarians.

24. Prevalence of dysmenorrhea was found to have no significant correlation with age at menarche, but was affected by total dietary intake. The number of girls experiencing dysmenorrheal decreased with increasing caloric, protein and iron intake.

25. Among the 400 menarcheal girls, the prevalence of dysfunctional bleeding (periods extending above 10 day) was found to be increasing with decreased caloric intake. The percentage of girls without dysfunctional bleeding increased from 70% to 100% with increasing calorie intake.

In the end it is worth noting that there is lack of research literature on various factors affecting menarcheal age especially weight, height, BMI and SMR stages reported from India. Also there is lack of enough research on aspects like prevalence of amenorrhea,
dysmenorrhea and age at menarche. These factors are least explored in Indian. It is therefore suggested that more longitudinal and semi longitudinal studies should be undertaken to establish the complex relationships and cope with various problems at this critical age.

The results of the present study may be used as guidelines for nutrition and health promotion in girls of menstruating age. Improved understanding of the patho-physiology of menstrual cycle may result in the discovery of more effective treatment regimens.