

SUMMARY

Adolescent growth represents an important phase in the growth and development of an individual, as it contributes significantly to the final attainment of anthropometric characters. The socio-economic class related differences in growth during adolescence were studied using the approach of growth modelling.

Boys from high (n=184), middle (n=63) and low (n=122) socio-economic class were observed longitudinally over a period of one year, both for anthropometric measurements and dietary intake. As the growth during adolescence exhibits marked individual variations, cross-sectional data has limited use. The present study, therefore, analysed the mixed longitudinal data and offers the estimates of important biological parameters like age at peak height velocity and adult height. Some of the important findings are listed below.

Almost all physical measurements were significantly lower in case of children from LSE as compared to those from HSE, as reported in some of the Indian studies (Tripathi A.M. et.al., 1976 , Vijayraghavan K. et.al. , 1971). It was however, interesting to note that differences in body weight

and height increased with advancing age (from 5.8 kg at 11 years to 10.3 kg at 16 years , and 1.5 cm at 11 years to 10.18 cm at 16 years).

In terms of comparison with NCHS standards, boys from HSE class were nearer to 25th percentile, while boys from LSE class were even below the 5th percentile. The differences in body mass index (BMI) were also glaring, indicating that differences in body composition were prevalent.

Estimation of body fat percent which was based on anthropometric measurements was attempted, by examining suitability of six equations reported in literature. One of the equations showed highest correlation with triceps skinfold thickness and lowest correlation with height, consistently for all the three socio-economic classes. Estimates of body fat percent using this equation showed significant differences among children from different socio-economic classes.

Besides 'size attained' the velocity with which growth is achieved is another important aspect of adolescent growth. It was observed that weight velocity did not differ significantly, while height velocity differed significantly especially during 13 to 15 years age.

The increase in velocity in height is of special significance with regard to adolescent growth and as such the data on height and height velocity were critically examined.

One of the major reasons for growth differentials observed for boys from different socio-economic classes was that the boys from LSE had poor nutritional status. Therefore when children were classified using weight for age criterion, it was observed that boys with better nutritional status (weight for age ≥ 75) gained more height at an early age, than the underweight boys (weight for age < 75), in each socio-economic class.

In view of estimating the biological parameters, fitting of two commonly used models namely logistic, and PBI was attempted. Often these models are fitted to individual growth data. But in view of the fact that generating 'pure' longitudinal data on sizable sample is difficult task, the suitability of these models to mean heights was investigated. Fittings of these models involves choosing proper initial estimates of the parameters. It was observed that while it was relatively easy to choose them in case of logistic model, in case of PBI it was extremely difficult. The information available in the literature regarding this is also scarce.

Amongst the various biological parameters, two parameters namely adult height and age at PHV could be correctly estimated from the data of mean heights. Similar observations have been reported by Tanner et.al. (1982). However, in case of other biological parameters, the suitability of using mean height data for PBI model appears to be limited.

The two biological parameters thus estimated, indicated that age at PHV for boys from HSE and MSE were closer (13.38 years, 13.08 years respectively), but were much earlier than that for boys from LSE class (14.82 years). The lowering of socio-economic status was thus associated with delayed age at PHV. The estimated adult height for boys from HSE group was considerably higher than boys from other two classes.

Model fitting was also attempted for examining within class variations in adolescent growth. The PBI estimates for adult height differed considerably for normal Vs malnourished children by either criteria (weight for age or height for age). However, the estimates for age at PHV indicated that boys classified as normal on the basis of height for age showed similar estimates (13.32 for HSE and 13.86 for LSE) despite wide socio-economic class differences.

But this was not true in case of weight status. Thus children from LSE class classified as normal on the basis of weight criterion showed higher age at PHV (15.19 years) compare to normal children from HSE (13.20 years). It thus appears that, although maintenance of good weight status exerts positive influence on age at PHV, this required maintenance of height status also, in case of children from LSE class.

The present study also investigated importance of better nutrition in the context of adolescent growth. It was observed that, better dietary intake was associated with higher increments ($r = 0.45$ for MSE, $r = 0.72$ for LSE), only before the age at PHV. This was true for both the socio-economic classes. The important implications of these findings are from the point of view of nutrition intervention programmes. It thus means that if the programmes are appropriately targetted for the children in the prepubertal stage even for the short period such as one year, the benefits could be seen in terms of higher increments assuring better growth during adolescence.

Thus in conclusion, the mathematical modelling proved to be an important technique not only for estimating

biological parameters of growth for a given community, but also for examining variations in growth of adolescent boys due to factors such as socio-economic status, nutritional status. The study also brought out importance of better dietary intake during adolescence for better growth performance.