

Growth Retardation in Early Childhood: Long Term Implications

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According to the National Family Health Survey (NFHS 3)¹ Report, 38.4 per cent of Indian children under 3 years are 'stunted', (heights <2SD of WHO/NCHS standards), 45.9 per cent are 'underweight' (weights <2SD of WHO/NCHS standards) and 19.1 per cent children are 'wasted' (weight-for-height ratios <2SD of WHO/NCHS standards). Though growth retardation has attracted wide-spread attention in the past twenty years, the improvement in the situation has been only marginal.

Growth retardation in Indian children has been reported to be of a greater order of magnitude than that observed in children in sub-Saharan Africa². Inter-country comparisons have their limitations. The important point is that the heights and weights of children belonging to the affluent sections of the population in India are within 1SD of WHO standards. It is clear, therefore, that the widespread prevalence of growth retardation among the poorer sections of the population in India is not a racial or genetic attribute.

Growth retardation may be considered to be an indicator of a deficit in the nutritional inputs that are essential for the full expression of the genetic potential during crucial stages of growth and development of the child. Though, a strictly linear relation between physical growth and other developmental attributes cannot always be assumed, growth retardation may be broadly considered to be a proxy for general developmental retardation. The correction of widely prevalent growth retardation must rank as a top priority and a major challenge for health and nutrition scientists. The mounting evidence pointing to the deleterious long-term effects of growth retardation in early childhood adds urgency to this challenge.

Long-term implications

The downward deviation from normal growth pattern seems to start at approximately the 3rd or 4th month of infancy, and progresses up to almost

the third year. Thereafter, the growth curve of Indian children from low-income groups runs almost parallel to the standard curve³.

Maternal undernutrition may be expected to be associated with intrauterine foetal growth retardation (IUGR), resulting in low birth weight of the offspring. Nearly forty years ago, Shanti Ghosh³ had shown that 33 per cent of the offspring of the poor were of low birth weight. Furthermore, these children when followed up for several years were found to continue to grow in a substandard growth trajectory, in contrast to children of the same socio-economic status with normal birth weights.

Barker and colleagues⁴ had later shown, in their extensive epidemiological studies, that the offspring who were subjected to IUGR (as reflected in low birth weights) could be so metabolically programmed as to grow in a substandard trajectory, and to be more vulnerable to chronic degenerative diseases in adulthood. Maternal undernutrition is, therefore, a crucial factor with respect to growth retardation in children.

Satyanarayana showed⁵ that, by the age of 5 years, Indian children of low-income communities with low birth weight were 16.5 cm shorter than their better-off peers; and that between the ages of 5 and 18, both groups grew as much in height as children in the U.S. However, the growth-retarded Indian children never made up the deficit. It would appear; therefore, that early childhood (<3 years) is the vulnerable period when stunting sets in.

The children studied by Shanti Ghosh and Satyanarayana belonged to the poorest groups in the population. It may be argued that the nutritional inputs, which the children received in later childhood and adolescence, continued to be inadequate. The substandard growth may therefore be a reflection of continuing undernutrition in the rest of the growth period and not necessarily a long-term effect of growth retardation in early childhood.

Recent studies of Yagnik et al.⁶ and Bhargava et al.⁷ indicate that catch-up growth in later childhood, in an effort to correct earlier growth retardation, could make the subjects vulnerable to obesity and diabetes. The depressing message from these findings is that, once the child is subjected to growth retardation in infancy and early childhood, it will be counter-productive to reverse growth retardation in later childhood through additional nutritional inputs.

India is currently in a state of rapid developmental transition wherein millions of families, currently in poverty are likely to acquire relative affluence in later years. Affluence could facilitate better child nutrition and promote catch up growth. The observation that catch up growth could increase vulnerability to obesity and diabetes is disturbing considering that there is already a steep escalation of type II diabetes mellitus in the country.

In a study of adopted Indian orphans in Sweden⁸ it was found that: children who were "stunted" on arrival in Sweden with values for height/age below -3 SD continued to exhibit significantly lower height/age as compared to children who were not stunted on arrival, even at the end of 2 years. The mean final (adult) heights attained by the adopted Indian girls was 154cm – just 1cm taller than the values reported for Indian adult girls of less privileged groups in India, but considerably less than the mean final adult heights attained by Swedish girls, and also less than the mean final adult height of 159.2cm attained by Indian girls of affluent families in India. Significant differences with respect to final height attained were evident as between the girls who were stunted to start with and those who were not.

An important finding, which has a bearing on the data regarding final attained heights in adopted Indian girls, was that rapid catch-up growth in childhood had actually precipitated an earlier onset of puberty (11.8years). Onset of puberty in the adopted Indian girls occurred over one year earlier than in the Swedish reference population (12.9years) and in affluent Indian girls in India (12.8years), and more than 2.5years earlier than in underprivileged Indian girls (14.4years) the earlier onset of puberty in the adopted Indian girls reared in Sweden had cut short the childhood phase of growth

and had thus reduced the overall duration available for growth. Thus what was gained in the swing (accelerated growth in childhood) was more than lost in the roundabout (shortening of overall duration of growth due to earlier onset of puberty).

These observations clearly indicate we cannot hope to solve the problem of low birth weight through “bypassing” the mother and focusing our efforts on the infant in the postnatal period. The depressing message is that growth retardation in early childhood arising primarily from undernutrition

Table: Prevalence of childhood stunting relating to the heights of adult women in various Indian States

States	Stunting in children % <-2SD ht /age WHO-2006	Percent women with height <145cm
Kerala	24.5	8.6
Tamil Nadu	30.9	9.5
J & K	35.0	4.8
Manipur	35.6	8.0
Punjab	36.7	4.5
Himachal	38.6	6.1
Delhi	42.2	6.9
Andhara	42.7	12.1
Arunachal	43.3	13.3
Rajasthan	43.7	5.0
Karnataka	43.7	9.9
Uttranchal	44.4	7.5
WB	44.6	14.3
Orissa	45.0	13.1
Haryana	45.7	4.4
Maharashtra	46.3	10.6
Assam	46.5	15.8
INDIA	48.0	11.4
Gujarat	51.7	8.7
Chattisgarh	52.9	11.9
meghalaya	55.1	21.6
Bihar	55.6	15.9
UP	56.8	14.4

Source: Reference 1

has a lasting impact on growth and development. As Tanner remarked⁹, “at some stage before the age of 5, children are locked in a trajectory from which they cannot then escape”.

Contrary to these observations there have been reports, which are at variance with claims regarding the inevitability of continuing growth retardation in children who were stunted in early childhood. These and other studies on stunting had been ably reviewed by Waterlow¹⁰. In his inaugural address at the Symposium on ‘Recent

Trends in Nutrition’ organized by NFI, Waterlow drew attention to the fact that Prader et al¹¹ had shown enormous capacity for catch up growth in children with celiac disease or hypothyroidism after treatment; that Cooper et al¹² in Jamaica had shown increase in height velocity in grossly stunted children after treatment of Trichuris infection; and that Graham and Adrianzen¹³ had recorded substantial catch up between 4 and 8 years in previously malnourished children who were adopted by privileged families. However these studies were apparently not continued long enough to decide the effect of catch up growth on the final attained heights and on susceptibility to obesity and diabetes.

Latest data provided by NFHS 3¹⁴, also seem to run counter to conclusions regarding inevitability of continued stunting following growth retardation in early childhood. Data presented in Table1 indicate that higher prevalence of childhood stunting is not necessarily accompanied by higher prevalence of short stature of adult women within the same State (geographical region). For example, the prevalence of childhood stunting is higher in Haryana than in Kerala; yet, the percentage of adult women with heights <145 cm. is higher in Kerala than in Haryana. There are obvious limitations in interpreting these data pertaining to different generations, and no far-reaching conclusions can be drawn from them per se. The data would suggest, however, that there are as-yet-unexplored strands in the link between childhood stunting and adult heights.

Conclusion

The intra-uterine phase, growth in infancy and growth in early childhood together constitute the crucial window of opportunity for ensuring the optimal growth of children. The battle for optimal growth has to be fought and won in this crucial phase. However, further studies are necessary to throw more light on the long-term implications of early growth retardation. Such information is vital so that we can put in place a meaningful policy for promoting the optimal growth of children from low-income sections of the population.

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● State of Health in Bihar

Dr Almas Ali, the noted health scientist and his colleagues of the Population Foundation of India have brought out a Comprehensive well-illustrated book “State of Health in Bihar”. This book views health from a broad development perspective. It reviews social, economic, and demographic and health status of the Bihar population, health care delivery system and district wise explores policy and programme option to bring about sustained improvement in health status of the population. The book should prove useful to Nutrition Scientists and policy makers.