ASSESSMENT OF CHILD GROWTH: SOME BASIC ISSUES

Measurement of growth has been a widely used tool for the assessment of health/nutritional status of children. For the evaluation of growth performance, the observed level of growth has to be compared with a 'standard' which is considered to best represent "normal" growth. 'Normal' growth may be defined as the level of growth which is (and can be) attained by the child when its innate genetic potential for growth finds full expression–in a situation wherein dietary and environmental constraints on growth are eliminated. Children of Europe and North America and, to a large extent, those of Japan, can be generally considered to be mostly free from dietary and environmental growth constraints and to have, more or less, achieved their full genetic potential for growth. This, however, is not as yet the case with the large bulk of children of developing countries including India.

Choice of a Growth Standard

The growth standard considered to represent 'normal' growth, and which is currently being widely used for the purpose of evaluation of growth performance in many countries, including India, is the one developed by the National Centre for Health Statistics (NCHS) of USA, based on growth measurements of large numbers of American children.

An Expert Group of WHO had recommended(1) after a careful examination of data worldwide, that the NCHS standard was best suited for use as an "international reference", since it meets most of the criteria considered necessary for the choice of a standard. The Group, however, cautioned that while this standard might be internationally applicable for children up to 10 years of age, its use for all populations beyond this age point may not be justified in view of wide differences in the time of onset of puberty among different population groups.

The NCHS standard does not differ significantly from the Harvard standard in use earlier as far as under-fives are concerned, though there is some minor difference with respect to older age groups. In national programmes in Indian the Harvard standard has been extensively used for assessment of growth performance of children. The classification suggested by the Indian Academy of Pediatrics (IAP)–a modification of the Gomez scale, for the gradation of growth retardation using the Harvard standard as the yardstick, has been in general vogue.

Some Basic Questions

Some basis questions in the matter of assessment of growth performance may be briefly considered.

1. Is the attainment of the full genetic potential for growth, a goal desirable and necessary? The answer to this must be in the affirmative, because the attainment of a level of growth reflecting the full genetic

potential implies freedom from dietary and environmental constraints during the crucial phases of development. It reflects optimal health and nutritional status, which is most likely to favour full physical development. We may concede that the attainment of the full genetic potential for growth of an individual need not necessarily imply similar such attainment with respect to all other genetically conditioned attributes which contribute to his 'quality' as a human being. The environmental conditions necessary for the attainment of different desirable human attributes may not be identical; and the achievement of maximal attainable height need not be an essential requisite for optimal performance with respect to every function. Even so, it is reasonable to expect that an environment which poses the least dietary and socio-economic constraints to physical growth, would also be the one most likely to favour the full flowering of the personality. This is borne out by the several reports of strong association between the heights of populations and their general level of socio-economic attainment(2). Evaluating growth performance by comparing it with an accepted standard indicator of 'normal' growth is therefore a valid procedure.

2. Is the Harvard, or the more recent NCHS, standard based on measurements of American children, appropriate for Indian children? Why use American standards for Indians? Why not have our own "National Growth Standard"?

The debate on this issue has been influenced by two entirely different lines of reasoning. The first—a valid one, is that the inherent genetic potential for growth of Indian children may not be the same as that of American children. According to this line of reasoning, the use of NCHS standard will be fully justified only if it is established that there are no truly significant differences with respect to genetic potential for growth as between Indian and American children. The other line of reasoning, which is clearly unacceptable is the one inherent in such hypotheses as "Small is healthy for the poor", "cultural adaptation", *etc.* The argument here is, that even if it be the case that there are no significant differences with respect to genetic potential for growth as between Indian and American children, developing countries like India, in view of their "ecocomy and ecology" (euphemism for poverty) should deliberately set for themselves a growth standard, which represents a level of growth less than what the NCHS standard represents, and what their own innate genetic growth potential would permit. Arguing for such a 'realistic' approach Seckler(3) had, for instance, suggested that not only the Harvard and NCHS standards, but even the 'best indigenous standard' derived from growth measurements of their affluent sections would be "abnormally large" for Indians, the majority of whom are poor. Here was a perverse plea for letting the magnitude of the problem determine the yardstick for its measurement, rather than using a yardstick to determine the magnitude of the problem—somewhat like adjusting the "minimal requirement for a pass" in order to ensure a satisfactory percentage of passes! We must firmly reject these counsels of despair which seek to condition us to acceptance of moderate degrees growth retardation as the "normal" inevitable lot of the large bulk of our children.

Application of NCHS Standard to Indian Children

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netic differences are currently the major determinants of difference between the growth performance of children of developing and developed countries(4). According to this conclusion while minor genetic differences with respect to growth potential of populations cannot be entirely ruled out, these are not of an order to justify multiple 'national' growth standards, at least as far as under-fives are concerned. Even so, it is important for us to find out if the NCHS standard is in fact applicable to Indian children, and, if so, to determine to what extent and in what stages of growth, it is so applicable.

The obvious approach towards determining if the genetic potential for growth of Indian children corresponds to the level of growth indicated by the NCHS standard, would be to actually determine the growth performance of truly affluent Indian children not subject to socio-economic and dietary constraints. There are, however, several limitations to this seemingly straightforward approach. In the first place, it is hard to define true affluence, as there are different orders of affluence even as there are different orders of poverty. Different segments of the populations of our country are in varying stages of there "ascent" to normalcy, moving up from an 'underdeveloped' to a 'developed' state at varying speeds. In the middle and high income groups, successive generations of children are taller and heavier than their parents. However, this 'secular trend' in growth has apparently not as yet reached a plateau phase even in some of the most affluent segments of our populations. In countries like USA, and Canada, fifty years of uninterrupted socio-economic development were necessary before the secular trend reached a plateau phase. The secular trend in Japan has not, as yet, come to a complete halt despite four decades of unparalleled prosperity. India will need several more years of prosperity and freedom from undernutrition for all sections of its populations, before current variations in growth patterns among different groups and between different regions of the country are eliminated, and the genetic potential for growth finds its full expression among all sections. In the present stage of developmental flux, "growth standards" developed on the basis of actual growth performance of even the affluent sections of the population, may be valid only for the next five or ten years, for the reason that the secular trend is still operational in many affluent sections.

However, if the growth performance in at least some sections of the society, which may be considered the most affluent, has even at present reached the levels represented by the NCHS standard, the case for the adoption of the NCHS standard would be strong. The expectation here is that as the secular trend further unfolds, growth levels among the rest of the population will also rise to the level observed in the currently best "sentinel" group till a final plateau is reached, and regional and intra-regional differences are ironed out. In short the question that has to be answered is: are there presently in our country any affluent sections of the population in any region, the children belonging to which show a level of growth which measures up to the 50th percentile of NCHS standard?

Under-fives

The Nutrition Foundation of India had carried out a coordinated multicentric (seven centres) study of the growth pattern of pre-school children (0-5 years) belonging to affluent class parents(5). Some of the leading pediatricians of the country had

participated in this study. The study showed that while there were some regional differences with respect to growth pattern of affluent children (as was to be expected), children of Punjab and Delhi had achieved levels of growth which corresponded to the NCHS standard. Pooling of the data from all seven centres, in order to obtain an 'average' which could serve as a 'national standard' was considered unjustifiable for the reasons that: (a) there was evidence of considerable heterogeneity between the subjects of the different regions, and (b) such 'pooling' would have amounted to ignoring the variations with respect to the present stage of secular trend in growth in children of different regions. Affluent children of different regions of the country are apparently yet in different stages of their "journey" towards ultimate attainment of the level of growth which would represent the full expression of their genetic growth potential. On this basis, it was concluded that the use of NCHS standard for Indian under-fives would be justified; and it was recommended that it will be prudent for us to continue to use it. It was considered that separate regional growth standard which in reality would not be truly representative of any region, would be scientifically unjustifiable and of no practical advantage.

Adolescents

A study of affluent adolescent girls (9-18 years of age) drawn from four different regions of the country (Delhi, Bombay, Calcutta and Coimbatore) had again revealed considerable regional differences with respect to patterns of growth among affluent adolescent girls(6). The affluent girls of Delhi, who showed the best growth performance, were as tall as American girls (NCHS) at all ages till their 11th or 12th

year. However, after the 12th year, the growth of the Indian girls did not keep pace with that of their American counterparts. The entire difference in height as between Indian and American girls at their eighteenth year had accrued between their 12th and 18th years. This is a picture very similar to that reported in Japanese girls as well(7). Studies in Japan have shown that in the case of adolescent boys also, growth pattern is almost identical to that of NCHS till about the 15th year, and that practically all the differences in mean heights at their 18th year as between American (NCHS) and Japanese boys accrued between their 15th and 18th years. The growth pattern of Japanese and Indian affluent boys have been found to be largely similar(8).

It would seem from these data that the secular trend with respect to growth that has occurred in Japan and possibly among the most affluent sections in India (represented by the Delhi sample), has resulted in the virtual abolition of differences with respect to linear growth as between American children (NCHS) on the one hand, and Japanese and Indian children on the other up to about the 12th year in the case of girls, and the 15th year in the case of boys. However, beyond these age-points the difference between the two groups persists with respect to both boys and girls, the growth levels of the Asian adolescents being lower. These observations would prove the validity of the note of caution sounded by the Expert Group of WHO, that universal use of NCHS standard for children beyond 10 years of age, for all populations may not be justified.

In the study by Agarwal et al, reported elsewhere in this issue(9), growth performance of boys and girls of affluent class of 5 to 18 years from eight states of the country had been investigated. The *pooled data*

from this study showed that average growth had approached the 30-40th percentile of NCHS till 6.5 years in boys and up to 10 years in girls but that thereafter it dropped to 10th, 20th percentile of NCHS.

It will be noted that Agarwal et al. had pooled their data in order to arrive at an average, ignoring the implications and possible significance of regional differences with respect to dietary habits which may be expected to be reflected in growth patterns of children of the different regions. In this respect the treatment of data in Agarwal et al's study differs from that adopted in the NFI study referred to earlier, wherein deriving an average from pooled data from different regions was deliberately avoided for reasons discussed earlier.

However, irrespective of these differences between these two studies, the important point of agreement between them is the observation of increasing divergence between the NCHS growth pattern and the growth pattern of Indian adolescents in late adolescence. There are three possible explanations for this phenomenon: (a) that this is a reflection of true genetic difference in adolescent growth pattern as between Asian and American subjects; (b) that in developing societies, growth retardation in children during their adolescent phase of growth, would require a much longer time (generation)-span for its abolition than what would be needed for the abolition of growth retardation in the pre-adolescent phase; and that, for this reason, while the secular trend with respect to growth might have reached the plateau phase as far as pre-adolescent growth is concerned in both Japan and (affluent sections of) India, it might not have as yet reached that plateau stage as far as the adolescent phase of growth is concerned; this would imply that with passage of time and continued afflu-

ence, current differences in patterns of growth in late adolescence as between Asian and American children could also disappear; (c) that the lower height gain during late adolescence in Japanese and Indian children, as compared to their American counterparts could be due to poor bio-availability of calcium from predominantly cereal based Asian dietaries rich in phytate. This is to assume that Asian dietaries of even the affluent are unable to meet the sharp rise in the calcium requirement during adolescent growth spurt.

The subject of adolescence growth thus poses many unanswered questions, and offers fascinating challenge to researchers.

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NOTES AND NEWS

AN UPDATE IN PEDIATRIC CARDIOLOGY

An Update in Pediatric Cardiology will be held *Sunday 1st November, 1992* at the Maulana Azad Medical College, New Delhi under the auspices of the Indian Academy of Pediatrics, Delhi Branch.

The topics to be discussed include: Balloon Interventions in Infants and Children; Echocardiography in Congenital Heart Disease—Utility of Transesophageal Imaging; Congestive Heart Failure in Infancy and Childhood; Recent Advances in Pediatric Cardiac Surgery in India; and other topics relevant to the Indian setting.

The Guest Faculty comprises eminent personalities from abroad and India—Dr. Robert Freedom (Professor of Pediatrics and Pathology, University of Toronto, Faculty of Medicine, The Hospital for Sick Children, Toronto, Canada); Dr. David Wauth (Medical Director, Echocardiography Department, Providence Medical Centre, Seattle, WA, USA); Dr. Mihai Gheoughiade (Chief of Cardiology Services, North Western Memorial Hospital, North Western University, Chicago, Ill, USA); and others.

Registration Fee:

Delegates—Rs. 100/- (till October 31, 1992)
Spot Registration—Rs. 125/-
(Please add Rs. 10/- for outstation charges).

The cheques/demand drafts should be drawn in favour of "Pediatric Cardiology Update".

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