

SOME PROBLEMS IN STUDYING GROWTH AND DEVELOPMENT OF CHILDREN – A METHODOLOGICAL NOTE

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Abstract: The author sketches some methodological problems of growth studies, based on her experiences in India.

Key words: Representative sample, Recording of data, Standardization of measuring instruments, Landmarks, Personality of the investigator, Statistical techniques.

I feel gratefully honoured to be invited to join the group of scientists at the IVth International Symposium of Human Biology. I wish to owe my special thanks to Dr. O. G. Eiben for providing me this opportunity.

I am very happy to observe the strength of this Symposium. It appears that we all have made it a point, how busy may be, to contribute towards this important and noble field which is absolutely imperative for the advancement of child's health and to monitor morbidity and mortality besides other significances. The very presence of all is testimony to the success of our mission. Children are our links to the future and they are who are going to shape whatever brave new world come into being. This led to develop the need of the child's study which has emerged out at the junction of great many disciplines and not merely as a product of the scientific zeal directed towards understanding child.

Recent advances in social, medical, political, and behavioural sciences have placed a child in perspective significance. The care of the child is no longer subject to a wilful choice of the parents. It has gained a status of a categorical necessity. Every nation developed or developing links its future with the present status of a child and striving their best for optimum development of the child. As a consequence, many countries have formulated the national policy to uplift the overall development of the children, especially related to the field of child's health under banner of health for all by the year 2000 AD. GO B1 (G = Growth, O = Oral Rehydration Solution, B = Breast Feeding, I = Immunisation) is a programme developed with the assistance of the UNICEF to monitor the child's health, by reducing morbidity and to prevent mortality and by raising the level of child survival. Keeping in view the theme of this Symposium limiting only to child's growth under the caption of human biology, I would restrict myself only to this.

The child's growth and development, is a major concern of the parents, society and of a nation. It gives the direct expression of the child's health. Despite it is so much significance if one looks at the literature, one does not find adequate record where one can say a word about child's growth with confidence. Of late this has been a matter of deep concern for the competent scientists, particularly physical anthropologists and paediatricians. Further, they are fully aware that it is scientifically wrong to use foreign growth standards to compare the somatic development of the children of their own country. Come what may the scientists of the developing countries still depend upon the foreign growth standard, to evaluate their children.

Emphasis to study child's growth is manifold and varies with interest and disciplines to which a researcher belong. For instances, the interest of an embryologist is to study the intrauterine growth and to investigate the mechanism that makes the embryo grow; Cytologists and histologists study the structure and functions of growing cells. Morphologists are concerned with the problems of organisations, i.e. how the different body organs develop to attain the adult body shape. While the anatomists confine themselves to bone development.

These scientists wish to have deep insight about child's growth though from different stand point yet one thing is common among them all that most of these attempt comprehend growth changes right from the conception to the senescence. The entire life span is further divides into various epochs, i.e. prenatal, infancy, early childhood, pre-puberty, puberty, post-puberty, early adulthood, middle age and old age to facilitate understand mechanism of growth. In addition, there are various types of growth namely physical, physiological, pubertal, skeletal, dental, chemical and cellular, and so on which is required to be explored for the deep and thorough understanding of the growth and development pattern of the children. Be it as it may be, the morphological growth is the mere expression of all types of the internal growth occurring in the body at different ages.

Consequently, everyone who finds himself in the presence of child, whether that be for a short period of time or more or less permanently, is likely to engage in a relatively haphazard manner employing inconsistent methods to study the child's growth. Subsequently, these studies led us neither towards any sound conclusion nor can be comparable with each other. Further, any growth evaluation done based on either of the findings would obviously be not reliable.

It is not my purpose here and it is not feasible to offer a detailed exposition of the research methodology employed in different fields of human growth and development despite its vastness. I will restrict myself to point out only some common problems which need to be taken care of while studying child's growth.

The most common obstacle encountered by the scientists dealing with growth studies is to secure *representative sample* at different age groups. Although, it is relatively easier to get desired sample size at certain ages from school or college compared to new born infants or older adolescents and young adults. This is why the studies relating to latter years of life are scanty. This does not imply, however, that one should overlook the importance of adequate sample size. I would quote an example indeed how many researchers are really conscious. In a recent review held by Madnick and Bair (1981), out of 70 European studies, a careful scrutiny of the list shows that only 26 studies have representative sample of well-defined population. Three of these (1946, 1958, 1970) British birth cohorts are representative of a national child population. It is unfortunate that some workers do not concern over the use of non-representative sample feeling that resulting bias will not be serious when studying change over time. Such opinions are absurd and erroneous.

It is a different matter not to be choosy than adopting a sampling procedure. An appropriate sampling not only reduces the chances of bias but also ensures the representativeness of the sample. I will strongly emphasize the representative sample is a prerequisite of any research and not only for growth studies, otherwise it is a waste of time and money.

To collect data, though appear to be simple but it is not so. One has to be very meticulous and calculative to ensure accurate *recording of the data*. In the growth studies, foremost and the most important is accurate age recording. It is difficult to elicit correct age of the children. There is no full proof criteria available to check its validity. It is more

so in the developing countries where a larger preponderance of population is poor and illiterate and the birth registration are of poor order. The poor population does not understand the significance of remembering the age. Of course, illiteracy of the parents do contribute towards inaccurate age recording. A study was conducted in Bombay where the age information obtained from the child, parents and the school records differed markedly. There is no clear cut way to overcome it except for approximating child's age through the family's history. In India, Desi calendres, national or personal temporal events of significance are generally associated to estimate age of the child. These are helpful in ascertaining the correct age but involves lengthy procedure and usually takes much longer time than anticipated at face value. On the contrary, the children and parents of the upper strata are age conscious but they do not want to reveal their correct age to an outsider/stranger. The school records are also found biased. At times, also the researchers do not take pains to estimate it thoroughly. Under such circumstances, the investigators resolve to use his insight to arrive at correct age of the child. Inaccurate recording of age is a serious problem in small children where even days and weeks alter the results. Hence it requires due attention of the investigators.

Prior to 1950, there was not much emphasis being given to the *standardization of instruments* used to measure the body. After 1950, the anthropologists did actually realize the standardisation of the instruments. As a result of this, many sophisticated instruments came up into existence to measure the body. Unfortunately, these instruments are available only in some countries and their availability in other countries including India is almost zero. Consequently, one, as observed is forced to depend upon the local manufacturer. Oftenly, some researchers resort use of indigenous or improvised instruments. This practice restrict comparability of the results across the studies. I wish to pinpoint here that selection of the tools for collecting data requires a special attention. The instruments selected for study on the basis of their availability and ease in administration without caring for their reliability, validity and accuracy may distort the conclusion of the study. Therefore, it is recommended that before selecting an instrument, a list of the instruments measuring the variables of the interest should be obtained and its description should be thoroughly grasped to know its technical know-how. The sensitive instrument with relatively lesser error with its proven reliability and validity should be preferred for the purpose of research work. The differences in the skinfold values have been observed when measured with Harpenden and when with Una caliper made in India.

The need of sufficient time at the disposal of the researcher and co-operation of the subject is desirable component. Further, if a researcher is unable to build a workable rapport with the subjects, he may likely to elicit inaccurate information because no body likes that any stranger should pry into the personal affairs. Consequently, he may refuse completely or partly for some of the growth observations.

Next most important is marking of the *landmarks* and finding out an accurate location prior to making growth records. Generally, that the researchers are over-confident with regard to the landmarks and they do not care to pinpoint its location. For example, to measure the upper wid-arm circumference, an investigator should take a trouble of measuring it after marking exactly at mid of between the points acromian and olecranon but in practice, sometimes just eye approximation is done which no doubt would affect the results adversely.

Likewise prior to record any body measurement, an investigator should ensure that the subject is placed in the standard recommended position. For instances for measuring height if the subject is not in the fully erect and in Frankfort horizontal position, there is a likelihood of difference in height of a few millimetres.

Further, the success of a growth study can depend on the personality of the investigator. We must take into consideration how permissive is a society. But a stranger is a stranger. No one would like to display oneself and especially to the members of the opposite sex whenever it happens, in case of paid volunteers and others, there must be some internal inhibitions causing variation in the measurements which probably have not been ever realized in affluent countries. It is just to recommend that needful caution in this respect may be considered.

In view of the above discussion, it is essential to be meticulous and not in hurry while collecting data, otherwise a researcher may overlook many things resulting in yield of inaccurate data. Simultaneously, the study subjects should be co-operative and relaxed.

We are in a computer age, it has become a fashion that all the analytical problems should be solved with the use of a computer. Those who use computer considered more competent and superior than those who have no accessibility to the computer. It has been noted several times because of dependency on the computer and its simplicity, the statistician over emphasize than what it requires or vice versa. It is further undeniable that computer scientists may not fully understand the nature and the complexity of the growth data. He simply tries to do the best he can offer. Such situations are much disheartening. At times, the complicated statistical procedures are preferred to impress upon. On the contrary the researcher himself is the best person to adjudge the nature of the *statistical techniques* required. The use of simple statistical is much more revealing many times. In one of my recent study, it is found that McQuitty linkage design is simpler and give a better understanding and above objective compared to those of cluster, factorial, discriminate function or multiple regression analysis. With the use of simple statistics, there is an excellent examples of the analysis about the effect of illness on the growth rate from Oxford child health survey. It is very essential to maintain a balance between the practical and theoretical research. If a research is of practical nature, a simple statistics such as cut-off points, percentiles, simple procedures of clustering, etc. are the best. In case of theoretical research complicated statistical designs like factorial, etc. might give some insight in them mechanism of the observation to the theorists. Hence the balance between the two is desirable for adequate inference of the research. I would suggest that use of the statistics should be considered as a mean and not the end.

A number of problems related to growth research methods in the growth studies have been pointed out. These operate at three level: firstly, at the level of the researcher; secondly, at the level of the subjects, and thirdly, at the level of the instruments. I am fully aware of that most of us are known to these but when it comes to practice, we tend to overlook while conducting a study.

As such, it is very difficult to compare growth differences of the populations because of varied economic systems, occupations, cultural patterns, educational systems, welfare facilities, varying eating habits, patterns of morbidity and mortality as well as sanitary and medical facilities. These all are responsible to bring out growth variation. Also, there is no way out to measure, how best method may be, that how much a difference in growth parameters is due to environment or due to genes. What-so-ever may be, it is beyond the human control to demarcate a distinct line between genetically controlled variations and environmentally controlled variations. In fact these are so overlapped that its extent of assessment is highly speculative.

It is clear that the variations occurring in growth of children are of two types, one is naturally or biologically controlled and another is largely under our control.

Latter are those variations, hazards or obstacles which are bound to occur because of planning of inconsistent methodology, carelessness at the part of investigators and in-

appropriate selection and use of the instruments, etc. In case we do not put sincere efforts to minimise the methodological variations; it will not be possible to highlight the factual growth variations and would remain in confounding state.

In the end, my humble submission to the distinguished delegates, who so-ever has a concern with growth studies, is that due care should be taken to make the study meaningful. Lastly, I strongly feel the emergent need to develop a newer and innovatory strategy on a common platform acceptable internationally in regards to uniformity of methods, techniques, instruments and rationale to be adopted irrespective of the discipline. I am sure this would help better understanding the growth differences among populations and solving out the child's health problems which is consistently prevailing globally.

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