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# Growth and Nutritional Status of War Khasi Children

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ABSTRACT The present paper attempts to show the growth and nutritional status of the War Khasi children of Meghalaya with regard to height for age and weight for height. An interval method of determining the cut-off point and trigger level was proposed for the assessment of growth and nutritional status of children. It may be suggested that growth retardation is not only the manifestation of undernutrition and infection, but also that complex intreraction between genetical and environmental factors. Relaxation of selection pressure among the elites seems likely to be related to the attainment of the so-called genetic potential.

## INTRODUCTION

Growth of children is considered a good indicator of health and nutritional status of a community (Eveleth and Tanner, 1990). According to Brown (1984), nutritional status is the "physical expression of the relationship between an individual's dietary intakes, the bioavailability of these ingested nutrients and his or her physiological requirements." In developing countries of South-East Asia, about 10% of the children under the age of 5 suffer from severe undernutrition, 15% are normal and the rest suffer from mild to moderate forms of undernutrition (Gopalan, 1992). Studies have revealed that the major cause of undernutrition in developing countries is the poor socio-economic condition (Martorell and Ho, 1984). So, assesment of nutritional status of children is useful not only for understanding the health status of a community, but also for national and/or regional policy planning. Accordingly, the historian, economists and policy makers have shown keener interest in this matter with a view to judging the magnitude of poverty in a population (Osmani, 1992).

Anthropometry is widely recorgnised as one of the most useful methods for the assessment of nutritional status (Jelliffe, 1966; WHO, 1986; Rao et al., 1986). It is generally agreed that the mild and moderate forms of undernutrition manifest themselves in varying degrees of growth retardation. Since these forms of undernutrition are not easy to diagnose, the use of anthropometry is very useful.

In the present paper, an attempt has been made to show the growth and nutritional status of the War Khasi children with regard to height for age and weight for height. The War Khasi are one of the sub-groups of the Khasi tribe. They are mostly confined to the southern slope of the East Khasi Hills district in Meghalaya. Like other Khasi Sub-groups, namely, Khynriam (upland Khasi), Pnar (Synteng or Jaintia), Bhoi and Lyngngam; the War Khasi have been following the matrilineal system of society, speaking the Monkhmer language which belongs to the Austro-Asiatic group (Khongsdier, 1994, 1995). The main occupation of the people in this area is agriculture and agricultural labour. Some of them are also engaged in business and services.

## MATERIAS AND METHODS

The present study was carried out in five villages of the War Khasi in the East Khasi Hills district of Meghalaya, following a 2% systematic random sampling of villages (Khongsdier, 1995). A cross-sectional sample of 129 children aged 3-5 years were taken for the present study. Anthropmetric measurements like heights and weight were taken on these children, following standard techniques (Weiner and Lourie, 1981). No statis-

tical sampling of individual was made owing to operational difficulties in the field. Instead, an attempt was made to include in our sample all those individuals who were willing to cooperate for the purpose of the present study. The age of the child was recorded according to the information given by parents and/or elderly member(s) of a given household. Estimation of age with reference to some important local events could not be avoided, whenever the exact age was not available. All the subjects were categorised into one year age group, *e.g.*, 3 year age group includes those children aged 2.50 to 3.49 years (Sen, 1994).

For the classification of growth and nutritional status in the present population, the cut-off points and trigger levels were estimated. The cut-off points or critical limits were estimated according to 95% confidence interval based on the t-distribution, *i.e.* $\bar{x} - t_{0.05}$ SD, or $- t_{0.05}$ SD (for large sample size, it is equivalent to - 2SD, as suggested by the WHO, 1986). Since our data are inadequate, it is felt necessary to take $- t_{0.05}$ SD as the out off point for screening the sample size of children into two groups, *i.e.* $< - t_{0.05}$ SD and $\geq - t_{0.05}$ SD. Regarding the method of determining the trigger level, the cut-off point of $+ t_{0.05}$ SD derived from the group $\geq - t_{0.05}$ SD (*i.e.* normal sample size) was taken as another critical limit. As a result, the distance or interval between $- t_{0.05}$ SD of the total sample size and $+ t_{0.05}$ of the total normal sample size was statistically considered the trigger level for subsequent groupings (Table 2). It may be noted that the mean of sample size $\geq t_{0.05}$ SD can also be taken as the standard mean of the population, provided we wish to express in percentage as an example in table 2.

## RESULTS AND DISUSSION

Table 1 shows the menas and standard deviations of height for age of the War Khasi boys and girls according to population references. It is seen that the mean value of height for age in relation to the reference of the Indian Council of Medical Research (ICMR, 1972) is much higher than that with regard to the US National Center for Health Statistics (NCHS) reference (Frisancho, 1990). This holds good at all ages for both boys and girls. If we take into consideration the Waterlow's classification of malnutrition (Waterlow, 1972), most of the children show a growth retardation according to the NCHS reference, but the results are just opposite with respect to the ICMR reference.

**Table 1 : Mean and standard deviation of height for age among the War Khasi children**

| *Age and Sex* | *NCHS reference* | | *IGMR reference* | |
|---|---|---|---|---|
| | *Mean* | *SD* | *Mean* | *SD* |
| 3 Years: | | | | |
| Boys (N=25) | 89.85 | 5.75 | 100.09 | 6.40 |
| Girls (N=20) | 89.41 | 4.73 | 100.08 | 5.30 |
| 4 Years : | | | | |
| Boys (N=22) | 91.15 | 5.64 | 100.70 | 6.06 |
| Girls (N=20) | 91.69 | 5.27 | 101.78 | 5.85 |
| 5 Years : | | | | |
| Boys (N=23) | 91.20 | 5.83 | 100.57 | 6.43 |
| Girls (N=19) | 91.26 | 5.43 | 100.81 | 6.30 |

In view of these circumstances, the interval method suggested above (Materials and Methods) was adopted for assessing the growth and nutrutional status of children in the present population. It is found that there is no difference between and among population references in respect of growth and nutritional status, provided each of them follows the same device of grouping and data analyses (Table 2). So, it indicates that the present method takes into account the approximate feature of a population, thereby it is, to some extent, independent of the ethnic differences owing to genetical and environmental factors (Eveleth and Tanner, 1990). Moreover, it also shows that the use of international and/or national references for assessing the growth and nutritional status of children largely depends upon systematic methods of determining the cut-off point and

trigger level. The use of these references as standards or target of growth with regard to ready-made cut-off point and trigger level will undoubtedly give a different result, thereby leading to misinterpretation of the nutritional status of a community. Accordingly, the WHO (1986) have recommended to maintain the cut-off point of - 2SD for 'comparison of prevalences and for screening of populations'.

Table 4 shows the nutritional status of children according to weight for height. It is found that about 25.58%, 6.20% and 2.33% of the children suffer from mild, moderate and severe forms of undernutrition, respectively. So, it shows that almost all the undernourished children have suffered from mild to moderate forms of undernutrition.

We have already shown that the assessment of growth and nutritional status of children depends upon uniform and systematic methods of determining the cut-off point and trigger level, which is applicable to any population, irrespective of population references. Of course, it really warrants for further studies with increasing sample size to have a better understanding of this problem. Recently, Osmani (1992) has made a review on the controversy regarding the measurement of undernutrition by anthropometric method. He

**Table 2 : Growth status of 3 years old boys according to height for age (Examply of classification on the basis of 95% confidence limits of t-distribution)**

| *Cut-off points and trigger levels*[1] | | | *Frequency (%)* | | | *Growth Status* |
|---|---|---|---|---|---|---|
| *NCHS reference* | *ICMR reference* | *Sample mean*[2] | *NCHS* | *ICMR* | *Mean sample* | |
| <70.46 | <78.49 | <75.44 | — | — | — | Very short |
| 78.97-70.46 | 87.97-78.49 | 84.49-75.44 | — | — | — | Short |
| 87.48-78.9 | 97.45-87.97 | 93.54-84.49 | 40.00 | 40.00 | 40.00 | Below Average |
| 87.48-95-99 | 97.45-106.93 | 93.54-102.60 | 40.00 | 40.00 | 40.00 | Average |
| 95.99-104.50 | 106.93-116.41 | 102.60-111.66 | 20.00 | 20.00 | 20.00 | Above Average |
| 104.50-113.01 | 116.41-125.89 | 111.66-120.72 | — | — | — | Tall |
| >113.01 | >125.89 | >120.72 | — | — | — | Very tall |

1. Two cut-off points were estimated, *i.e.* $\bar{X}_1 - t_{0.05} SD_1/\sqrt{N_1}$ and $\bar{X}_2 + t_{0.05} \times SD_2/\sqrt{N_1 N_2}$, where $N_1$ = Total sample size, and $N_2$ = Total sample $\geq \bar{X}_1 - t_{0.05} SD_1/\sqrt{N_1}$.
2. The mean of the sample size $N_2$ is considered the standard mean.

The growth status of the War Khasi children according to height for age is shown in table 3. Since our data are inadequate, the two sexes are pooled together. It indicates that about 61.24% of the children show a normal growth in height. In comparison with the Harvard standard, in which sexes are combined (Jelliffe, 1966), only 28.68% of these children are found to have more the 95% of the expected height for age.

**Table 3 : Growth status of children aged 3-5 years according to height for age**

| *Growth Status* | *3years* | | *4 years* | | *5 years* | | *3-5 years (Total)* | |
|---|---|---|---|---|---|---|---|---|
| | *N* | % | *N* | % | *N* | % | *N* | % |
| Very short | - | - | - | - | - | - | - | - |
| Short | - | - | 3 | 7.14 | 3 | 7.14 | 6 | 4.65 |
| Below Average | 21 | 46.67 | 10 | 23.81 | 13 | 30.95 | 44 | 34.11 |
| Average | 14 | 31.11 | 22 | 52.38 | 18 | 42.86 | 54 | 41.86 |
| Above Average | 10 | 22.22 | 3 | 7.14 | 7 | 16.67 | 20 | 15.50 |
| Tall | - | - | 4 | 9.52 | 1 | 2.38 | 5 | 3.88 |
| Total | 45 | 100.00 | 42 | 99.99 | 42 | 100.00 | 129 | 100.00 |

trigger level. The use of these references as standards or target of growth with regard to ready-made cut-off point and trigger level will undoubtedly give a different result, thereby leading to misinterpretation of the nutritional status of a community. Accordingly, the WHO (1986) have recommended to maintain the cut-off point of - 2SD for 'comparison of prevalences and for screening of populations'.

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|---|---|---|---|---|---|---|---|---|
| | *N* | % | *N* | % | *N* | % | *N* | % |
| Very short | - | - | - | - | - | - | - | - |
| Short | - | - | 3 | 7.14 | 3 | 7.14 | 6 | 4.65 |
| Below Average | 21 | 46.67 | 10 | 23.81 | 13 | 30.95 | 44 | 34.11 |
| Average | 14 | 31.11 | 22 | 52.38 | 18 | 42.86 | 54 | 41.86 |
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nology, relaxation of selection pressure is quite obvious everywhere. For instance, natural selection is believed to operate in a population through differential fertility and mortality, but with the improvement of medical facilities, adoption of family planning methods, etc., selection pressure is relaxed to a great extent (Matsunaga, 1966). Similarly, the higher socio-economic groups of population are supposed to have better dietary intakes, education, child care, medical and sanitation facilities, etc. As a result, growth performance of their children is much better than that of their counterparts in the lower socio-economic strata. In this respect, it does look as if the relaxation of selection pressure is, of course, related to the achievement of genetic potential in growth performance of children. But what really concerns us is that among the majority of populations in developing countries, natural selection is still very active and plays a major role, as most of these populations are living in natural condition. In these populations, "natural selection can either promote constancy, direct continous change, or promote diversification", depending upon environmental variability, or stresses (Dobzhansky et al., 1976).

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