CHAPTER 13

SUMMARY AND CONCLUSION
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Summary

The cross sectional study on growth would be useful as an alternative to the growth standards as well as to suggest programmes and strategies for improvement of the nutritional status and proper management of health. This study also aims at to contribute towards further understanding of growth and development as well as it's maturation sequence in the economic background of the population and so forth to add informative data on physical growth on South Indian tribal population who is hitherto unstudied from this point of view.

The result of this work provides normative standards and a baseline data for future surveillance of secular trends in a population undergoing rapid socio-economic change. From anthropogenetic point of view, the tribes of Karnataka like their counterparts elsewhere in India are losing their tribal identity. Hence, to understand the process of microevolution of the primitive societies; this kind of study will be of much valuable for the physical anthropologists.

In South India, especially on growth studies among tribal children are very meager. A few studies pertaining to maturational sequence of tribal children of Andhra pradesh regarding cephalo-facial group as well as study of maturation sequence among circumferential,
subcutaneous fat and body weight in contrast to stature are available (Dharnia Rao and Busi 1995(1), 1995(2) & 1996). A few works relating to growth pattern and nutritional status of tribal children are available (Dharma Rao, 1995, Dharma Rao and Busi, 1997, 1998 & 1999 and Dharma Rao et al 1997). For the last ten decades foreign as well as Indian investigators have been reporting their works on tribal children of Karnataka are limited to height, weight, head and face measurements (Holland, 1901), Gray (1903), Thurston (1909), Schmidt et al (1910) Karve (1954), Adhikari et al (1987), Sirajuddin et al (1992), Gangadar (1999) and Keshava (2000) etc.). Hence, the present study regarding growth pattern of Soliga tribal boys of Karnataka were selected.

The study of growth among the 8 to 18 years boys belonging to the Soliga tribe has been selected because a) there is no record information about their growth and development, and b) they are one of the major groups among the Scheduled Tribes of Karnataka.

According to 1991 census, the total Scheduled Tribe population of Karnataka was 19,15,690 persons; of which 1,02,106 individuals were distributed in Mysore district (earlier Chamrajanagar included in Mysore district). As per 1981 census, the Soliga population was 16,389 persons (8,389 males and 8,000 females). The most of the Soliga tribes distributed in Chamarajanagar and Mysore district.
They are the inhabitants of uneven hilly terrain and forest area Kollegal Chamarajanagar, Gundlpet, Nanjangud and Heggi Devana Kote taluks of Mysore and Chamarajanagar districts. Most of the people reside in model houses provided by the government and non-government agencies. A few people yet reside in their thatched huts adhere to their traditional living style. The permanent settlements of Soligas in Heggada Devan Kote and Gundupet taluk are called 'hadi'. These are located near permanent villages of other castes; some of the 'hadi' are isolated. A settlement in hill slope or forest with lesser number of families is called 'podu'.

The Soliga have two groups such as Male Soliga (or Podu Soliga) and Urali Soliga (now a days they are rarely distinguish themselves as such groups). The Male / Podu Soliga more affinity with Kannada spoken, and the Urali Soliga speak a dialect, which is mixture of Kannada and Tamil, but both groups speak Kannada with others. The nuclear families prevail among the Soliga. The sub groups of the Soliga are traditionally endogamous in nature. Recently, there have been a very few cases of inter subgroups marriages between the Male Soliga and Urali Soliga. The clans are exogamous, but in the case of the five clan Soliga (Male Soliga), both mother's and father's clan are avoided. A woman, even after marriage, retains her affiliation to her mother's clan that is avoided when she marries off her children, cross cousin marriage like one's father's sister's daughter and mother brother's daughter are preferred.
The data collection is based on the economic condition of the Soliga boys and this data collected during September 1999 to August 2000. The total 1155 samples of Soliga boys aged between 8 to 18 years, are fall under the lower income group (LIG) are 644 and upper income group (UIG) are 511.

In the earlier part of the research proposal, aims and objectives of the present study was to include the following three economic constraints; the lower income group (LIG), the middle income group (MIG) and the upper income group (UIG). But, for want of sufficient sample size, the analysis of data has been done for two economic constraints viz, lower and upper income groups. Here, the middle income group and the upper income group have been merged together and are treated as upper income group. As the Soliga are economically backward, the populations under middle and Upper income classes' availability of sample size are meager. Therefore, to have a sizable data, this change has been done.

Applying two methods has carried out the analysis of the data. In the first method, the data relates to pooled group in which, the growth pattern, velocity of growth, rate of growth, growth gradients and 23-body indices are analyzed. Besides, indices have been compared
with other available data on scheduled tribe populations of Karnataka. It also explains nutritional status of the subjects irrespective of their economic background with the index \( \text{Weight} / \text{Height}^2 \) for different age groups i.e. from 8-18 years. In the second method, analysis of data has been carried out separately by their income group and has been compared with the growth pattern with each other as well as plots percentile distribution curve in order to find out impacts of socio-economic status on growth and development.

The aims and objectives of the present study is: (1) to delineate the Socio-economic status of the Soliga community at a broader perspective, (2) to record growth acquired among 8 to 18 years age group boys, (3) to ascertain the nutritional status of children who come under the study, (4) the compare the present data with available data on growth pattern to draw differences, if any, and finally (5) to observe relationship between growth pattern and economic status of community.
Conclusions

1. In the lower income group (up to Rs 3000 per capita per annum), the average family size is 5.43 ± 1.55, the earning members being 1.51 ± 0.54 and their average income stands at 2329.67 ± 1627.43. Among the lower income category 45.62 per cent of them possess 2.04 ± 1.29 acres per family and they are depends on occupation like agriculture (4.12 per cent), daily wage with agriculture (20.80 per cent), animal husbandry with agriculture (3.70 per cent), animal husbandry, daily wage with agriculture (16.26 per cent), serving in government job (0.21 per cent) and other skilled works (0.53 per cent). The rest 54.38 per cent populations are land less people, who mainly depend on daily wage (40.34 per cent) and daily wage with animal husbandry (14.04 per cent) etc.

2. In the Upper income group (per capita income per annum Rs 3000 and above), the average family size is 5.39 ± 1.63 with earning members 1.61 ± 0.56 per family and average income stands at 13120.67 ± 7787. Among upper income category 96.64 per cent of them possess 5.01 ± 3.14 acres of land per family. They are engaged in agriculture (8.65 per cent), daily wage with agriculture (12.02 per cent), animal husbandry with agriculture (35.10 per cent) daily wage, animal husbandry with agriculture (21.64 per cent), serving in government jobs (14.42 per cent) and other professional jobs (4.81 percent). The rest of the populations are landless (3.36 percent) and they are depended on daily wage (0.48 per cent), animal husbandry (1.44 per cent) and daily wage with animal husbandry (1.44 per cent) etc.
3. All the 26-body dimensions of the Soliga boys show progressive increase in successive years from 8 to 18 years. The magnitude of annual increment and the pattern of variation or rhythm of these measurements however differ from one measurement to the other.

4. In linear measurements, most of the measurements show maximum growth at 14 and 15 years except for leg length and foot length where it shows maximum growth at 15 and 16 years. The distance curves of all measurements show somewhat sigmoid shape; here, head length and neck length show rather shallow concavity from 11 to 15 years. However, velocity curves of these seven measurements show high sharp peak at 14 and 15 years. The other six measurements such as trunk height and leg length show high sharp peak at 12&13 and 15&16 years respectively. The upper arm length and fore arm length show high less sharp peak velocity as it spreads between 15 to 16 years. The lower extremity shows long peak velocity earlier between 9 &10 years and high sharp peak velocity at 14&15 years and finally foot length records long peak velocity at 8&9 years and high sharp peak velocity at 12&13 years.

5. In transverse measurements, the handbreadth attains maximum growth at 15&16-years, while the rest of the measurements show at 14&15 years. The growth curve of all measurements show more or less sigmoid shape. However, velocity growth curves of all measurements except head breadth and handbreadth are sharp during adolescent between 14&15 years. The head breadth shows long peak velocity at 10&11 years and high sharp peak velocity at 14&15 years where as hand breadth shows first high sharp peak velocity at 12 & 13 years and later long peak velocity at 15&16 years.

6. In the circumferential measurements, the maximum growth attains in calf girth, head circumference, upper arm and thigh circumference and finally chest circumference with respect to their age between 12&13, 14&15, 15&16 and 16&17 years. The distance curves of all measurements tend to show sigmoid shape. However, the velocity curve of the chest circumference
shows sharp peak velocity at 13&14 years followed by another long peak velocity curve at 16&17 years. The head circumference shows sharp peak velocity at 14&15 years while upper arm show it at 15&16 years. The thigh circumference shows less sharp peak velocity as it stretches from 14 to 16 years in calf girth show that the peak velocity is at 9&10 years, earliest to all circumferential measurements.

7. The maximum increase of skin fold thickness such as sub scapular and triceps measurements tend to show high at 16 and 17 years and at 12 and 13 years respectively.

8. The body weight shows maximum growth at 15 and 16 years, the velocity curve is less sharp peak velocity from 15 to 16 years.

9. The Soliga exhibit the existence of cephalo caudal as well as caudo-cephalic direction of maturation between the constituents of stature i.e. sitting height and lower extremity, between the extremity and within the extremity. However, the Soliga exhibit existence of mixed gradient or smaller area gradient more often within the constituent of the extremities for most of the ages (Tanner 1962, Scammon 1953, Nath et al 1991 & 1993).

10. The growth spurt of Stature occurs due to more deferential rate of maturation by increase of sitting height more advanced over the increase of lower extremity from 8 to 14 years and this trend (cephalo-caudal maturation sequence) is seen one year before the adolescent growth spurt. These findings are somehow similar to the studies of Tanner 1962, Marshall 1977, Nath 1971 and Nath et al 1991.

11. The circumferential measurements between head and trunk region, the growth of the head circumference is more advanced over the chest circumference at all ages. When girth measurements considered within the lower extremity, the thigh circumference advances over the calf girth at 8 and 9 years. However, for the rest of the ages, the calf girth advances over the thigh circumferences (caudo-cephalic maturational sequence) are noticed.
12. The maturity value of the two anatomical sites of body fat denotes that the limb fat (triceps skin fold) maturity advanced over the trunk fat (sub scapular skin fold) at all ages.

13. The Acromio-cristal index value constant between 13 to 14 years. The Femoro-Humeral index value constant between 13 to 14 years and 17 to 18 years i.e. in that ages neither increase nor decrease in the proportional growth. Thus, these two index shows quite difference with the rest of the indices noted.

14. Most of the measurements show maximum increase at the same age between the lower income group (LIG) and upper income group (UIG) of Soliga boys. But for the few measurements like trunk height, head breadth, calf girth and triceps skinfold the LIG boys show maximum growth at early ages of 13 years, 11 years, 10 years and 13 years respectively where as UIG boys shows at 15 years, 17 years, 15 years and 16 years with respect to above measurements. The other measurements like, the upper arm length, hand breadth and foot breadth among UIG boys attain maximum growth at early ages of 15 years, 13 years and 14 years respectively when LIG boys show at 16 years, 16 years and 15 years with respect to above measurements.

15. Lower income group and upper income group boys have shown that, the higher rate of growth per annum recorded more or less same ages in most of the measurements. Moreover, some of the measurements such as trunk height (LIG: 13y, UIG: 15y) fore arm length (LIG: 10y, UIG: 15 to 16y), Lower extremity length (LIG: 10y, UIG: 15y) foot length (LIG: 9y, UIG: 13y), hand breadth (LIG: 11y, UIG: 17y), chest circumference (LIG: 14y, UIG: 17y), calf girth (LIG: 10y, UIG: 15y) and triceps skinfold (LIG: 13y, UIG: 16y) show higher growth rate in earlier ages among LIG boys and later ages among UIG boys, while few measurements like neck length (LIG: 15y, UIG: 14y), hand breadth(LIG: 16y, UIG: 13y) and foot breadth(LIG: 15y, UIG: 14y)
show higher growth rate in later ages of LIG boys and earlier ages of the UIG boys among the Soliga population.

a). From the above results, it is concluded that, the maximum growth and higher growth rate recorded at earlier ages of LIG boys than the UIG boys, and vis-a-versa. Based on these results, we cannot make meaningful conclusion as the study range limited between 8 to 18 years among economic groups of boys. Because, the continuity of maximum growth or growth rate may be missed the link among the study range. Hence, study of entire growth span may be worthwhile to measure maximum growth and growth rate. However, at all ages the UIG boys have higher mean values than the LIG boys do possess.

16. The stature at 15 years reveals that, the LIG boys have greater range of distribution between 75 to 95 percentiles than the UIG boys possess. When consider constituent component of stature such as sitting height percentile value is somehow equivalent to the UIG boys at 75 to 90 percentile values. In addition to this, the other component of stature such as lower extremity in LIG boys show at the 90 percentile value greater than that of UIG boys. From this consequence, it has known that, the stature of the LIG boys at 15 year, may have a more tendency to increase value between 75 to 95 percentiles also this make distance wider between 75-90 percentiles and this type of pervasiveness also called as catch up growth.
17. The nutritional status of pooled Soliga boys, reveal that, up to the age of 15 years, no boy comes under the normal range i.e. all of them are undernourished due to their complete dependency on their parents. The proportions of normal range of boys are found to be 3.6% and 22.6% at the ages of 17 and 18 years respectively, in view of their active participations with their parents in daily earnings for their family welfare as well as quench their hunger in little. Further, it is known that no boy falls under over weight category. Nutritional intake may be responsible for the under nourished among the Soliga boys.

18. The comparison study of 23 body indices of the Soliga boys with some other Scheduled tribe populations of Karnataka by its mean differences (Scheffe test) concludes that the Soliga show significant, more significant and highly significant with the Kadukuruba, the Jenukuruba and the Yerava respectively.