Chapter 4

CONCLUSIONS
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In the present study an attempt has been made to analyze and understand the variations existing between the crania belonging to different states of South India, especially Karnataka, Andhra Pradesh and Maharashtra. This has been done by taking into consideration both quantitative and qualitative variations understood in terms of metric and non-metric traits of human crania. Though a few studies have been conducted on metric and non-metric variations of North Indian crania, no work has been done on the study of such variations in South Indian crania. Hence, this study is undertaken.

Based on the Results and Discussions presented in Chapter 3, it becomes clear that, by and large the South Indian skulls exhibit a combination of both significant and insignificant variation in both metrical and non-metrical traits. This can be compared with the unity and diversity that we observe in the physical and cultural features of contemporary living populations of Indian sub continent.

The analysis of variations existing between the three Indian states in terms of metrical traits is done in three ways viz, comparison of three states with respect to a particular metrical traits by ANOVA test, pair-wise comparison between the three states by t-Test, and sex-wise comparison between the states, by taking the mean values of different traits. Comparison is also made by taking into consideration the relevant indices based on the metrical measurement. Apart from this correlation co-efficient
have been calculated for some metrical traits to see the
correlation between such related traits. Regression formula has
been derived to see the impact of one trait on the other.

The comparison of three states with respect to qualitative
non-metrical traits has been done by studying the state-wise and
sex-wise distribution of the presence or absence of each one of
these non-metrical traits.

In case of metrical traits, when the three South Indian
States are compared by ANOVA test, it is observed that, in 17 out
of 29 craniometric measurements, we observe significant
difference between the three states and in 12 measurements we
find insignificant difference. When pair-wise comparison is made
between the states, we find that in case of Glabella-Inion Length,
Maximum Cranial Breadth, Least Frontal Breadth, Nasal Length,
Palatal Breadth, and weight of the cranium there is a significant
difference between all the pairs of states, whereas, in case of
Upper Facial Length, Nasal Breadth, Maxillo-Alveolar Length,
Palatal Length, Horizontal Circumference of the skull, Transverse
arc, Nasal Profile angle, Transverse Diameter of the Foramen
Magnum, and Cranial Capacity there is no significant difference
between the pairs of states. In the rest of the metrical traits viz,
Bizygomatic Breadth, Bimaxillary Breadth, Orbital Breadth,
Orbital Height, Maxillo-Alveolar Breadth, Cranial Height, Facial
Profile Angle, we observe significant difference between Karnataka
and Andhra Pradesh as well as Andhra Pradesh and Maharashtra.
but the differences between Karnataka and Maharashtra are insignificant.

The pictures with regard to sex-wise differences between the states are very interesting. In almost all the metrical traits Karnataka male and female skulls both exhibit higher frequencies than the skulls of other states. Exceptions are seen in Maximum Cranial Length, Bizygomatic Breadth, where Maharashtra male skulls show higher frequency than others and in case of Horizontal circumference of the skull, Transverse Arc, Transverse diameter of the Foramen Magnum, weight of the Cranium and Right Orbital Capacity, Andhra Pradesh male skulls show higher frequency than others. In case of Greatest Frontal Breadth, Bimaxillary Breadth, Bizygomatic Breadth, Nasal Length, the Maharashtra skulls show higher frequency than others.

When the three Indian states are compared by ANOVA test various indices on the cranium, we observe significant differences in all the indices studied, but when pair-wise comparison is made for these indices, we find significant difference only in case of Cranial Index for all the pairs of states, whereas for Orbital Index, Nasal Index, Palatal Index and Maxillo-Alveolar Index significant difference is seen between Karnataka and Andhra Pradesh, and for Upper Facial Index, Orbital Index, and Index of Foramen Magnum significant differences are observed between Andhra Pradesh and Maharashtra. For Nasal Index, Palatal Index and Maxillo-Alveolar Index, significant differences are seen between Karnataka and Maharashtra.
When sex-wise distribution of these indices is seen in all the states, the Karnataka males and females exhibit higher frequency of distribution of these indices than others, whereas increase of orbital Index the Andhra Pradesh males show higher frequency and in case of Nasal Index the Andhra Pradesh females show higher frequency than others.

To identify the relationship between selected independent variable like Maximum Cranial Length and dependent variable like Maximum Cranial Breadth, simple correlations and simple regression analysis were carried out. Based on these analysis we can infer that Maximum Correlation exists between Maximum Cranial Length and Maximum Cranial Breadth; Upper Facial Height and Bizygomatic Breadth, Maxillo-Alveolar Length in the state of Andhra Pradesh whereas in the state of Maharashtra, maximum correlation exists between Orbital Height and Orbital Breadth; Nasal Breadth and Nasal Length; Palatal Length and Palatal Breadth; Antero-Posterior Diameter of Foramen Magnum and Transverse Diameter of Foramen Magnum.

From the Regression line between various parameters carried out separately for South India as well as for the states of Karnataka, Andhra Pradesh and Maharashtra, it can be inferred that the regression line for all the states of South India, it is found to be significant for the traits like Maximum Cranial and Maximum Cranial Breadth (except in cases of Andhra Pradesh), Bizygomatic Breadth and Upper Facial Height; Orbital Breadth and Orbital Height (except in case of Karnataka); Nasal Breadth
and Nasal Height; Palatal Breadth and Palatal Length, (except in case of Maharashtra); Maxillo-Alveolar Breadth and Maxillo-Alveolar Length, (except in case of Andhra Pradesh); Antero-Posterior Diameter of Foramen Magnum and Transverse Diameter of Foramen Magnum.

Based on the analysis of qualitative non-metrical traits in the three South Indian States, we can infer that, these three South Indian States of Karnataka, Andhra Pradesh and Maharashtra show significant variation in almost all the non-metric traits except in case of Os Sutural at Lambda, Os Sutural at Bregma, Parietal Foramen, Mastoid Foramen, Zygomatic Facial Foramina, Orbital Foramina, Condylar Canal, Precondylar Tubercle, Palatine Torus, Auditory, Highest Nuchal Line, Frontotemporal articulation. Where the variation is insignificant.

With respect to sex wise variation of these non-metrical traits we observe that, in almost all the non-metrical traits the sex-wise variation is insignificant except in case of Epiteric Os Sutural, Mastoid Foramen, Zygomatico-Facial Foramen, Extra Sutural and Ethmoidal Foramen, Double hypoglossal Canal, Paramoist Process, Maxillary Torus, Highest Nuchal Line, where there is significant variation between the two sexes.

An attempt has been made here to compare the results of the present study with those of the available data in India in terms of both metrical and non-metrical variations. It can be inferred that almost all the metrical measurements of the present
study show higher mean values when compared to the other studies except in case of Palatal Length.

In terms of non-metrical traits, our results show very high frequency in Parietal Foramen, Supra Orbital Foramen, Extra-Sutural Antero-Ethmoid Foramen. Post-Ethmoidal Foramen, Maxillary Torus, Palatine Torus and Highest Nuchal Line.

Finally an attempt has been made in the present study to classify the South Indian Skulls based on certain Indices and angles. Accordingly we can conclude that the South Indian Skulls can be classified as Mesocranial, (Cranial Index), Mesenueren (Upper Facial Index), Mesostaphylin (Palatal Index), Dolicouranic (Maxillo-Alveolar Index) and Narrow (Foramen Magnum Index).

On the basis of Cranial Capacity the South Indian Skulls (Both males and females can be classified as Eucencephalic and on the basis of Facial Profile angle and Nasal Profile angle, they can be classified as Orthoprognathus and Orthognathus respectively.