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Non metric traits in permanent dentition among South Indian population - A Forensic overview

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ABSTRACT

Introduction: Non-metric dental traits are transmissible characteristics of teeth that show variations in their expression both within and between the populations. The significance of these traits are their phenomenon as a pattern in a particular population and their frequency in a particular race. Nonmetric dental traits have an important role in categorisation of a population that helps in forensic ethnic identification purposes. The aim of the study is to assess the frequency of non metric traits in permanent dentition among south indian population.

Materials And Methods: The study was conducted in Saveetha dental college. The study sample included 110 extracted teeth. The non-metric dental traits were examined according to 10 main traits. The teeth were visually examined and accordingly tabulated. Descriptive analysis was done, graph representation of percentage distribution was done using the software SPSS version 23.

Results: The total distribution represents only the 5 mainly available traits among South Indian population, where cusp of carabelli shows the highest count of 22, second highest is the shovelled incisor of count 18, peg shaped lateral incisor of count 10 and interruption groove count of 9 and dryopithecus groove pattern of 7.

Conclusion: The highlighted trait was the cusp of carabelli and shovelled incisor more common among the traits. These traits could be used as one of the substantiation tools for human identification

Keywords: *Non metric traits, extracted teeth, variations, dental, human identification.,innovative technology, novel method*

INTRODUCTION

Forensics, also called criminalistics, is the branch of science associated within criminal and civil laws procedure(1). Teeth are durable structures that preserve themselves in the best way in archaeological and fossil records (2). Dental anthropologists have long recognised teeth for what they can tell us about the lives of ancient peoples.(3). Dental non-metric traits are highly ethnic and can be used to interfere with biological affinity between different populations. The mean estimate of divergence results finds that dental non-metric trait frequencies vary between archaeological periods in statistical terms, but the extent of difference is minor. (4)

Non-metric dental traits are transmissible characteristics of teeth that show variations in their expression both within and between the populations (5). The significance of these traits are their phenomenon as a pattern in a particular population and their frequency in a particular race. Nonmetric dental traits have an important role in categorisation of a population that helps in forensic ethnic identification purposes (6). These dental morphological or nonmetric traits elucidate the historical, cultural, and biological macro- and micro-evolution which help to puzzle out the displacement, migration paths, and ethnic variation of human evolution (7). The non metric traits are seen to be managed by genetics so these can be profitably used in the description of the ethnicity which can be helpful in determining the person through the dental records (8). This is possible because teeth commonly are protected even in the utmost conditions in which skeletal remains and enamel being the hardest tissue of the human body, having the capacity to withstand high temperatures and taphonomic processes (e.g., time, environment,

pH, salinity, humidity, attack by trace elements (9). The aim of the study is to assess the frequency of non metric traits in permanent dentition among the South Indian population.

Our team has extensive knowledge and research experience that has translate into high quality publications (10),(11),(12),(13),(14),(15),(16),(17),(18),(19),(20),(21),(22),(23),(24),(25),(26),(27),(28),(29)

MATERIALS AND METHODS

An observational pilot study was conducted in Saveetha dental college and hospitals, Chennai. The study sample included 110 extracted teeth. The non-metric dental traits were examined according to 10 main traits which include cusp of carabelli, talon's cusp, shovelled incisor, and peg shaped lateral incisor, protostylid, dryopithecus groove pattern, hypoconulid, parastyle, bushman canine, interruption grooves. The teeth were visually examined and accordingly tabulated. Descriptive analysis was done, graph representation of percentage distribution was done using the software SPSS version 23.

RESULTS

According to the data, with respect to 10 non metric traits only 5 have been analysed among the South Indian population. The total distribution represents only the 5 mainly available traits among South Indian population, where cusp of carabelli shows the highest count of 22, second highest is the shovelled incisor of count 18, peg shaped lateral incisor of count 10 and interruption groove count of 9 and dryopithecus groove pattern of 7 (Table 1), (Figure 1). TABLE 1:

TABLE 1: Indicates the tabulated distribution of dental non metric traits observed from 110 extracted teeth. Cusp of carabelli shows the highest count of 22 followed by shovelled incisor (18) and peg shaped lateral incisor (10).

Non metric traits	Out of 110
Cusp of Carabelli	22
Talons cusp	0
Shovelled incisor	18
Peg shape lateral incisor	10
Protostylid	0
Dryopithecus groove pattern	7
Hypoconulid	0
Parastyle	0
Bushman canine	0
Interruption groove	9

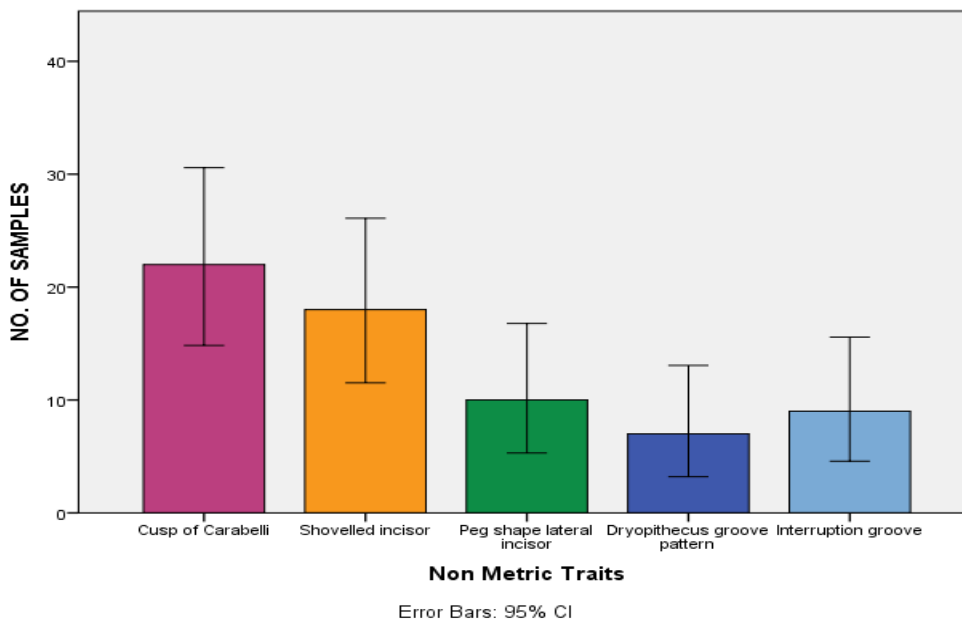


FIG 1: Bar graph representing the percentage distribution of non metric traits, x axis represents the non metric traits and y axis represents the number of teeth with these non metric traits. The pink colour represents cusp of Carabelli, dark blue represents Dryopithecus groove pattern, light blue colour represents interruption groove, green colour represents peg shaped lateral incisor, yellow colour represents shovelled incisor. The total distribution represents only the 5 mainly available traits among South Indian population, where cusp of carabelli shows the highest count of 22, second highest is the shovelled incisor of count 18, peg shaped lateral incisor of count 10 and interruption groove count of 9 and dryopithecus groove pattern of 7.

DISCUSSION

Non-metric dental traits are transmissible characteristics of teeth that show variations in their expression both within and between the populations. According to the data, with respect to 10 non metric traits only 5 have been analysed among the South Indian population. The total distribution represents only the 5 mainly available traits among South Indian population, where cusp of carabelli shows the highest count of 22, second highest is the shovelled incisor of count 18, peg shaped lateral incisor of count 10 and interruption groove count of 9 and dryopithecus groove pattern of 7.

Various theories explain the differences between the traits among different races. There are two theories which can explain this variation. Field theory suggests that the trait is influenced ,it is affected by environmental stresses such as vitamins, nutrients, intake of fluorides and the size of the jaws. While clonal model theory suggests that the trait is inborn. Thus, traits are the result of interaction between genetic and environmental factors.

Several studies related to the study recommended that when there is an unique trait pattern compared to those of seven coeval human groups using a multivariate statistic of biological distance (mean measure of divergence), (30). For several of these traits the frequencies found in Neanderthals fall within the range of contemporary modern humans: Shovel shaped incisors , multiple lingual cusps, double shoveling (31). For other traits Neandertals present frequencies that are either exceptionally high Bushman's canine, Carabelli's cusp, Y groove pattern, mesial metaconid, transverse crest, asymmetry, anterior fovea and mid-trigonid crest) or exceptionally low (hypocone absence and four-cusped) relative to contemporary modern humans(32). Archaeological verification, however, supports an interrelation between populations on opposite sides of the mountains and

thus is in concur with the dental data.

As anticipated, discrete dental traits appear to be more useful than metric dental traits in assessing such population affinities.(33). According to the study of Coppa et al, the Paleo-Mesolithic populations share several distinguished traits with the Neolithic group (34). Many investigators found significant differences between sexes in the expression of Carabelli's trait. (35)

The present study suggested that the South Indian population for the study who formed the sample had high frequencies in the cusp of carabelli compared to other studies. Shovelled incisors also showed increased expression in this study population. These traits can be useful in determining the racial origin and human identification.

CONCLUSION

The study represents the fact that among several non metric traits, only 5 of them have been found among the South Indian population. The highlighted trait was the cusp of carabelli and shovelled incisor more common among the traits. These traits could be used as one of the substantiation tools for human identification. Dental non-metric traits are heritable variants in tooth form and structure that can be used by biological anthropologists and forensic odontologists to estimate the genetic similarity of past human populations.

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CONFLICT OF INTEREST

The authors have none to declare.

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