

Innovations

Shovel Shaping of Maxillary Incisors: A Morphological Study

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Abstract

Background: Odontology as a specific field has emerged recently, playing pivotal role in various other areas related to it. Since tooth is a calcified structure and resistance to varying temperatures & traumas, making it perfect as a useful tool in various studies and investigations. Maxillary incisor with deep and large lingual fossa and prominent mesial and distal marginal ridges are called shovel shaped incisor. Due to distal displacement, the mesial ridge is slight longer than the distal marginal ridge. **Aims and Objectives:** The present study was undertaken to identify the different shovelling patterns in incisors among different populations residing in Lucknow india. **Materials and Methods:** 600 total females (300 each) from two different caste populations – Brahmin and Rajput were taken under study. The Hardik scale was used to categorize the degree of shovelling in incisors. **Results:**The study Indicates that shovelling patterns were more pronounced in Rajput females than the Brahmins counterpart. **Clinical significance:** The present study on the shovelling pattern of Incisors may prove to be a useful tool for personal identification in forensic dentistry and mass disaster victimidentification.

Key Words: Odontology, Shovelling, Incisors, Populations, Lucknow, India.

Introduction

Shoveling, first introduced by Muhlreiter in 1870 (El- Najjar et al., 1978) is a condition occurring from a concave lingual surface of the upper incisors and sometimes of lower incisors and canines too, in which the mesial and distal ridges become elevated enclosing a

concave central fossa, bilateral maxillary orientation in incisors. Rarely seen in mandibular incisors. Though this trait is quite an ancient one, it is difficult to pinpoint its origin. Hrdlicka (1920) by his pioneering work in dental anthropology among different populations conclusively stated the order as Mongoloid > Negroid > Caucasoid, and pronounced shovelling in the incisors of American Indians(indiandentalacademy.com).

Shovelling of incisors is an important trait, helpful in forensic investigations to forensic odontology, disaster identification etc. through comparison. Preponderance of this trait is seen on higher side in mongoloids, when compared to Caucasians.

Although forensics and odontology have been recognized as important disciplines for identifications in developed countries, but when we talk of countries like India, Bangladesh Iran & Pakistan to name a few developing countries, its practical applicability is yet to see the brighter side (Nagaraj et al., 2015). The present study was undertaken to identify the various shovelling patterns of incisor in Lucknow, India and the data was compared from different parts of India.

Aims & Objective

Dentition and dental health are important aspect in life, especially humans. With time, changes have been witnessed in due course of evolution, leading to diversifications within species. One such characteristic trait is shovel shaping of incisors.

The main aim of the present study is to understand shoveling of incisors in the females of Brahmin and Rajput females of Lucknow, and their comparative differences across India, with the meagre data present with regards to females.

Research methodology

The current study has been conducted on female individuals of two caste groups, namely the Brahmins and Rajput, belonging to district Lucknow of Uttar Pradesh. The sample size studied included a total of 600 individual (300 Brahmin and 300 Rajput) females, between the age groups 6 – 25 years, with the help of **dental casts** made from alginate hydrocolloids sol gel. The dental impressions or dye are the exact replica of the and gives its negative on reproduction and by filling it

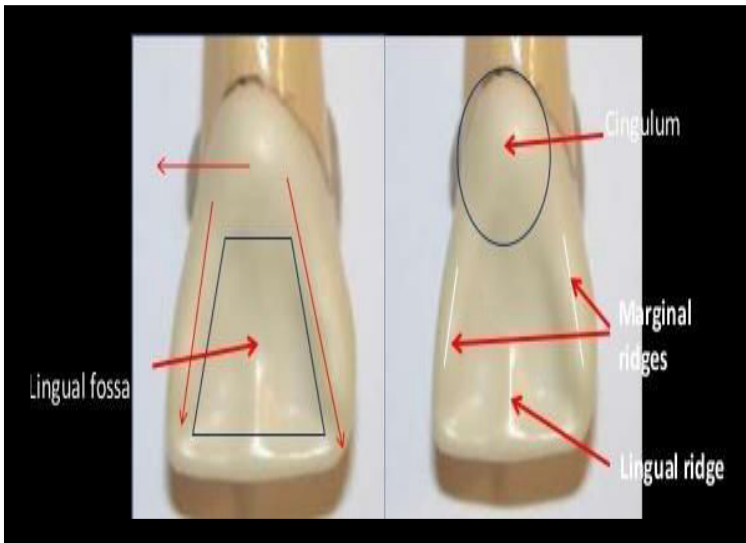


Figure 1- characteristics of shovel shape incisor. Image courtesy: - dental-anatomy-physiology-of-permanent-teeth-31-638, jpg.



Figure 2- types of shovel shape incisors. Image courtesy: Reconstruction of a shovel shaped incisor (Researchgate.net)

with dental stone, a positive cast is made that can be removed, when the model material has set.

The sample size chosen were randomly selected from various

institutions, schools, colleges, Lucknow University & households of various localities.

It was also kept in mind that the dental cast collected from individuals is devoid of any discrepancies.

The shovel shape trait of incisors was studied in sub category of

- Trace
- Semi
- Full / strong
- Nil / absent

In order to understand the extent of similarities and differences between the populations studied, the chi square test (χ^2) test along with degree of freedom was taken into consideration.

$$\chi^2 = \frac{\sum (O - E)^2}{E}$$

O = observed number, E = expected number

Result

Table No. 1 Shovel Shaping of Maxillary Incisors

| Population | No. of Individual | Nil | Semi | Normal | Strong | Chi square & Degree of freedom |
|------------|-------------------|------|------|--------|--------|---------------------------------------|
| Rajput | 300 | 6.33 | 28.6 | 39.0 | 26.0 | $\chi^2 > .001 = 93.182$, d.f = 3 |
| Brahmin | 300 | 37.0 | 28.0 | 23.3 | 11.6 | |

The data related to the trait is presented in table no. 1, the interpretation of which shows that in 6.33 percent of the Rajput do not show any kind of shoveling, while 28.6% of them exhibit semi shoveling, 39.0 percent of them have normal shoveling while the rest 26.0 percent show very strong nature of shoveling.

While quite a contrast picture comes to light for the Brahmins. In them the number of individuals showing nil value accounts 37 percent, semi-shoveling in 28 percent, 23.3 percent have normal and only 11.6 percent show very strong shoveling.

Thus, significant difference occurs between the two caste groups for no shovelling, normal and very strong shovelling. The chi-square test values at $\chi^2 > .001$. having a value of 93.182.

Discussion

Table No. 2: - Presence of Shovel Shaping of Maxillary Incisors in Various Populations

| Population | Sex | Number of Individual Examined | Proportion | Authors |
|------------------------|-----|-------------------------------|------------|--------------------|
| Modern Bengalee Skulls | M | 384 | 47.4 | Pal, 1964 |
| Haryana Jats | F | 72 | 91.7 | Bhasin et al. 1979 |
| Brahmins (A.P.) | F | 217 | 39.9 | Rami Reddy 1981-82 |
| Pattusalis (A.P.) | F | 426 | 7.3 | |
| Muslims (A.P.) | F | 426 | 7.3 | |
| Karnataka Females | F | 999 | 25.5 | Rami Reddy 1983 |
| Lingayats | F | 447 | 30.2 | |
| Brahmins (Lko) | F | 300 | 63.0 | Present Study |
| Rajputs (Lko) | F | 300 | 93.67 | |

From the above table it is clear that the Pattusalis and Muslims females of Andhra Pradesh have the least presence of shovel shape in their incisors, accounting for 7.3% each only. Their highest presence is seen in the Rajput of Lucknow (93.67%), followed by the Jats of Haryana (91.7%), the Brahmin of Lucknow (63.0%), Bengali skull (47.4%), Brahmin of Andhra Pradesh (39.9%),Lingayats (30.2%) and the Karnataka females (25.5%).

Table No. 3: -Comparative Chart of ShovelShaping of MaxillaryIncisors

| Population | Authors | Sex | Sample size | Trace | Semi | Full | Absent |
|-----------------------|--------------------|-----|-------------|-------|------|------|--------|
| Karnataka | Rami Reddy, 1986 | F | 891 | 19.2 | 6.1 | 1.9 | 72.8 |
| Nicobarese | Ganguly 1960 | F | 292 | 24.0 | 20.9 | 15.4 | 39.7 |
| Modern Bengali Skulls | Pal 1964 | F | 50 | 22.0 | 12.0 | - | 66.0 |
| Jats- Haryana | Bhasin etal., 1979 | - | 72 | 19.3 | 63.3 | 8.3 | 8.4 |

| | | | | | | | |
|-------------------|-----------------------|---|-----|------|------|------|------|
| Muslims (A.P.) | | F | 852 | 4.0 | 2.1 | 2.3 | 91.6 |
| Pattusalis (A.P.) | Rami Reddy, 1982 - 86 | F | 160 | 28.1 | 18.1 | 5.6 | 48.2 |
| Brahmin (A.P.) | | F | 868 | 35.4 | 5.0 | - | 59.6 |
| Brahmins Lko | Present Study | F | 300 | 28.0 | 23.3 | 11.6 | 37.0 |
| RajputsLko | Present Study | F | 300 | 28.6 | 39.0 | 26.0 | 6.33 |

From the table no. 3, it is clear that the Muslims females of Andhra Pradesh (A.P.) differ extensively with all the populations mentioned, for the absence of shovelling of incisors. 91.6% females do not exhibit shovelling, followed by the females of Karnataka (72.8%), the Bengali skulls (66.0%), Brahmins of Andhra Pradesh (59.6%), Pattusalis of A.P.(48.2%), Nicobarese(39.7%), and the Brahmins of Lucknow(37.0%). Rajput females of Lucknow (6.33%) and the Jats of Haryana (8.4%), are closer in percentage of absence of shovel shape incisor indicating some sort of relationship within the populations.

Table No. 4: - Chi square Test for Shovel Shape Maxillary Incisor Traits in Populations

| Populations | χ^2 | Populations | χ^2 |
|---------------------------------|----------|--------------------------------|----------|
| Brahmins X Muslims (A.P.) | 65.900 | Rajput X Brahmin (Lko) | 93.132 |
| Brahmin X Brahmin (A.P.) | 29.746 | Rajput X Muslims (A.P.) | 100.921 |
| Brahmin X Modern Bengali Skulls | 25.280 | Rajput X Modern Bengali Skulls | 90.332 |
| Brahmins X Nicobarese | 32.376 | Rajput X Nicobarese | 34.921 |
| Brahmin X Karnataka Females | 36.213 | Rajput X Karnataka females | 39.043 |
| Brahmins X Jats | 40.859 | Rajput X Jats (Haryana) | 16.724 |

The limited data available on the shovel shaping incisor across India make it difficult to compare the data more effectively. All the populations mentioned here show variability with the present study populations – Brahmin and Rajput. They vary with their female counterparts like Muslims of Andhra Pradesh, Brahmins of Andhra Pradesh, Pattusalis of A.P., Modern Bengali skulls, Nicobarese, Karnataka females, the Jats of Haryana. Even the Brahmins of the present study vary with their counterparts from Andhra Pradesh, indicating that the shovel shaping incisor varies with populations throughout across India.

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