International Journal of Drug Research and Dental Science
Volume 5 Issue 4 (Page: 1-5), 2023 ISSN: 2582-0826

Gender Determination Using Nasal Septum: A Radiographic Study

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Original Article

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Crossref doi: https://doi.org/10.36437/ijdrd.2023.5.4.A

ABSTRACT

Aim: To research the nasal septum's morphometric analysis in relation to sex identification.

Material & Methods: A total No. of 200 individuals consisting of 100 males & 100 females. This research included visitors to the outpatient department who were at least 20 years old to evaluate the Presence of Nasal septum in a Digital posteroanterior skull view.

Result: Out of 200 study subjects, in 50% of the men and 63% of the women, there was a straight nasal septum pattern. Their Dimensions were measured & recorded according to age group.

Discussion: The nasal septum grows from the sixth to the twentieth week of pregnancy. The nasal septum varies and is divided into straight, right- or left-side simple deviation, sigmoid type, reverse sigmoid type, and other.

Keywords: Gender Determination, Nasal Septum, Posteroanterior Skull View.

Introduction

Their radiographic comparisons were very beneficial for positive identification. Radiographic evaluation of bone features in human remains or in living individuals is a potentially valuable approach for personal identification.[1]

The bone and cartilage in the nose that divides the nasal cavity into the two nostrils is known as the nasal septum (NS). The septum is made up of the maxillary crest, vomer, and the perpendicular plate of the ethmoid, and the cartilage is known as the quadrangular cartilage. Since the septum typically sits in the middle, the nasal passages are symmetrical.[5]

An aberrant condition known as a deviated NS occurs when the cartilaginous ridge's top tilts to the left or right or assumes a sigmoidal or reverse sigmoidal shape. Similar unusual features can be found in the frontal sinuses and in the five nasal septal configurations.[2]

In light of this, our research was conducted to investigate the different nasal septum patterns seen in a posteroanterior (PA) skull view and to

suggest a potential application for these patterns in individual identification.

Aim of the Study

1. To research the nasal septum's morphometric analysis in relation to sex identification.
2. To evaluate the value of the nasal septum pattern as a tool for sex identification.

Objectives of this study

1. To determine the sex of a person's nasal septum as a marker for identification in forensic examinations.
2. To establish a nasal septum of a given individual**.**
3. To determine a combination of many nasal septum patterns that allows for a more accurate identification than either one used alone.

Material and Methods

The patients arriving at the Department of Oral Medicine and Radiology at Karnavati School of Dentistry, falling in age of more than 20 years will be included in the study after obtaining the informed consent. Out of a total 200 subjects above the age of 20 years will be including same number of both males and females. After collecting demographic information, a brief description of their current disease, and past medical and surgical histories, they will be enrolled in the study.

Inclusion criteria

1. Individuals who appear to be in good condition and lack of any obvious signs of an asymmetrical skull.
2. The patient's age limit is 20 years and up.

Exclusion criteria

1. Facial asymmetries that run in families.
2. Previous orthodontic or orthognathic surgical history.
3. Previous maxillofacial injuries.
4. The past or clinical traits of any kind of systemic diseases, such as bone diseases.

Methodology

In the Oral Medicine & Radiology Department of Karnavati School of Dentistry, a research study was conducted. Among 200 people, 100 males and 100 females, who were visiting the outpatient department and were over the age of 20 in total, were enrolled in the study. Digital posteroanterior skull views were taken from the study subjects utilizing the X MIND PANO D+ under the manufacturer's suggested standard exposure parameters. Digital imaging and Communications in Medicine (DICOM) format was used to obtain the final pictures. (**Figure2**)

Figure 2: Patient positioning on Digital Panormaic system.

Digital Posteroanterior skull is taken by positioning the patient as the head is tipped downwards such that the film is touched on the forehead and nose. The film is perpendicular to the horizontal baseline of the radiographic projection. The midsagittal plane is used to drive the central ray through the film at a straight angle. Standard exposure using an exposure of 70-80 kvp, time 1.6 seconds at 50-60 mA in a standardized manner.

Nasal septum pattern (straight, sigmoid type and reverse sigmoid type) should be evaluated using PA view. (**Figure 1**)

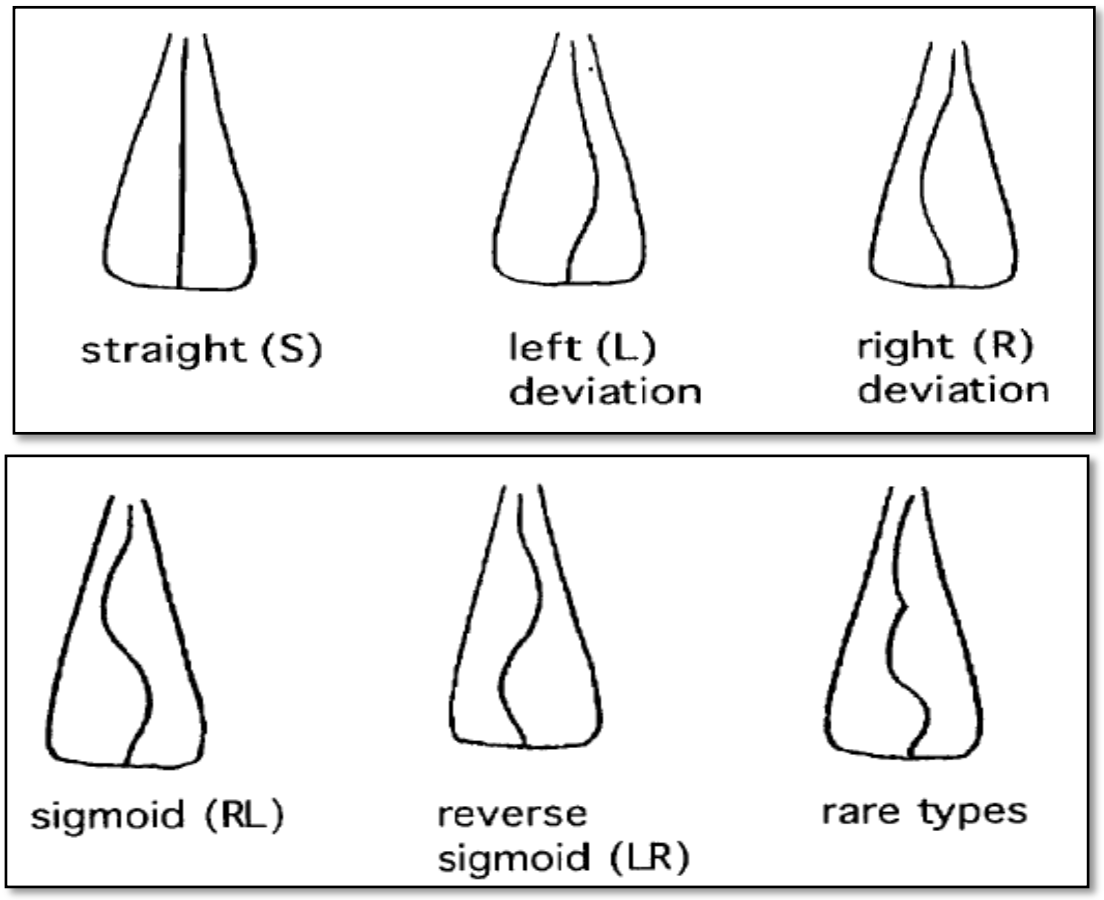

Figure 1: Diagrammatically representation of Nasal Septum Patterns.

Result

In 50% of the men and 63% of the women, there was a straight nasal septum pattern. (**Table 1**) Their Dimensions were measured & recorded according to age group. (**Table 2**)

Gender	Age		Number (%)	P-Value
	Mean	SD		
Male	35.11mm	10.76 mm	100 (50%)	> 0.05 NS
Female	33.68 mm	9.61 mm	100 (50%)	

Table 1: Nasal Septum- Gender and Age Wise Distribution (Unpaired T-Test).

Gender	Nasal Septum Pattern				
	Straight	Reverse Sigmoid	Sigmoid	Right Deviated	Left Deviated
Male	50 (50%)	34 (34%)	7 (7%)	3 (3%)	6 (6%)
Female	63 (63%)	20 (20%)	9 (9%)	5 (5%)	3 (3%)
Total	113 (56.5%)	54 (27%)	16 (8%)	8 (4%)	9 (4.5%)
P-Value	**> 0.05 NS**				

Table 2: Nasal Septum Pattern Gender Wise Distribution (Chi-Squere Test).

Discussion

A number of techniques, including fingerprint, dental, anthropological, genetic, and radiological studies, can be used to identify human remains scientifically.[2] DNA analysis is a widely accepted technique for confirming an unknown person's identification, although it is expensive and not necessarily appropriate in situations of widespread calamity.[6]

The nasal septum grows from the sixth to the twentieth week of pregnancy. The nasal septum varies and is divided into straight, right- or left-side simple deviation, sigmoid type, reverse sigmoid type, and other. (**Figure 1**)

In our research, many types of nasal septum deviation were observed. The reverse sigmoidal was followed by the straight NS, which was the most prominent. In 50% of the male patients and 63% of the female subjects, there was a straight nasal septum pattern. Statistically, no significant difference was present between Gender and Nasal Septum Patterns.

In contrast to studies conducted by Taniguchi et al. and David and Saxena, which found that the patterns of NS were respectively 22%, 42%, 30%, and 2%, the present study found that the patterns of NS were respectively 56.5% straight, 4% right deviation, 4.5% left deviation, and 8% sigmoid.[2]

Deviated NS is brought on by hereditary factors, trauma, nose compression during labor, and various genetic connective tissue illnesses like Marfan syndrome, Ehlers-Danlos syndrome, and homocystinuria.

The different nasal septum patterns were not significantly correlated with one another ($P > 0.05$). These findings supported Taniguchi M; et al.'s experiments, leading to the suggestion that using a variety of FS and NS patterns in combination leads to a more accurate identification than using either pattern alone.[3]

In contrast to the study conducted by Verma et al., where the gender distribution of NS was present despite being equal, it was discovered that male dominancy existed in all NS patterns with the exception of bilateral aplasia.[4]

Conclusion

We found that there was a lot of individual variance in nasal septum patterns. Our research led us to the conclusion that the patterns of the nasal septum, as visible on the PA skull view, could be employed as one of

the tools for identifying a certain person. Since it did not require special knowledge, a Dentist could easily use it.

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How to cite this Article: Chavda. H. R; Modi. P. A; Chavda. K. D; Khandelwal. R;; *Gender Determination Using Nasal Septum: A Radiographic Study;* Int. J. Drug Res. Dental Sci., 2023; 5(4): 1-5, **doi:** https://doi.org/10.36437/ijdrd.2023.5.4.A
Source of Support: Nil, **Conflict of Interest:** Nil.
Received: 28-9-2023 **Revised:** 14-11-2023 **Accepted:** 20-11-2023