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# *Deviated Nasal Septum Prevalence and Associated Symptoms in Maharashtra Population of India*

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## ABSTRACT

*Deviated nasal septum (DNS) is defined as the deviation of the nasal bone, cartilage, or both from the midline of the face. DNS causes nasal blockage, watery discharge, nasal airway resistance, snoring, headache, facial pain, and cosmetic problems. DNS is the most common predisposing factor for chronic sinusitis. The present study was designed to analyze the prevalence of DNS and associated symptoms among the population ofMaharashtra state, India. Two hundred patients reporting to the school of dental sciences, Karad, Maharashtra, India were recruited based on the inclusion and exclusion criteria. The demographic data of the patients including signs and symptoms of DNS were recorded in predesigned proforma. The patients were subjected to Orthopantomogram radiographic analysis to detect the type of DNS using Carestream, CS 8100 device. The DNS was classified according to Mladinas classification and subjected to statistical analysis. Out of the 200 subjects, 132 were males and 68 were females. DNS was observed in 136 patients (80 males and 56 females). Type II DNS was the most common, followed by type III. Patients suffering from symptoms of DNS were 124, with nasal obstruction as the most common complaint followed by nasal discharge. The prevalence of DNS was more among females, and type II DNS was most common among Maharashtra's population. Nasal obstruction was the most reported symptom. Early diagnosis and treatment of DNS in an individual, will reduce the symptoms and improve the quality of life.*

**Key words:** *Deviated nasal septum, Nasal obstruction, Nasal discharge, OPG, Sinusitis*

## INTRODUCTION

The nasal septum is a two mm thick tissue, which separates the right and left nasal passages, composed of cartilage, bone, and fibro-fatty tissue. The displacement of the nasal septum from the midline is termed Deviated Nasal Septum (DNS). DNS may be congenital and may also occur due to nasal injury in the intra-uterine life, during parturition, or accidental trauma to the nose [1]. The majority of people with DNS deformity, do not suffer from any signs and symptoms of illness. Some patients with DNS experience symptoms like nasal obstruction, breathing difficulty, sinusitis, bleeding from the nose, snoring, sleep disturbances, facial pain, postnasal drip, headache, and male infertility [2, 3]. The prevalence of DNS among the general population is above 80%, with variations in different ethnic types [4]. Adiagnosis of DNS is arrived after a physical nasal examination and considering the patient's symptoms. The radiological aids used to diagnose DNS are orthopantomogram (OPG), paranasal sinus view, Computed Tomography (CT) scan, and Cone-beam computed tomography (CBCT) [5-7].

Various classifications are used to differentiate DNS in an individual [8, 9]. Identification and classification of DNS will help in developing the treatment strategy, for the correction of anatomical, physiological, psychological, and cosmetic complications. The data regarding the prevalence of DNS among the general population of Maharashtra state, India is sparse. There is a need to ascertain the prevalence of DNS among this population. The present study was conducted to detect the DNS using OPG and study the associated symptoms among the Maharashtra population of India.

## MATERIALS AND METHODS

*Study design*

This prospective, cross-sectional, radiological study was conducted among 200 people aged between 18–60 years of Maharashtra state, India. The subjects were enrolled in the study at the department of oral medicine and radiology, school of dental sciences, Karad, Maharashtra state, India.

*Sample size*

A sample size of 200 was calculated based on the prevalence of deviated nasal septum at 67.5% from a national survey, with the allowable error of 5% using the statistical formula, n = Z2pq/L2.

*Inclusion and exclusion criteria*

The patients willing to be part of the study were included, and mentally challenged, pregnant women and previous history of rhinoplasty procedures were excluded from the study.

*Ethical approval*

The study was conducted following the principles of the World Medical Association Declaration of Helsinki 2013 [10]. Institutional ethical clearance was obtained from Krishna Vishwa Vidyapeeth (KVV)University, Karad, Maharashtra (KVV/IEC/07/2020), before commencing the study. Informed consent was obtained from all the patients prior to their enrollment in the study.

*Data collection*

The demographic data of the patients were recorded in predesigned proforma. Ahistory of symptoms of DNS, like facial pain or pressure, nasal obstruction, nasal discharge, and headache were noted. All the patients were subjected to orthopantomogram radiographic analysis using Carestream, CS 8100 device (Carestream Health Inc., Noisy-le-Grand, France), to identify and classify the nasal septum deviation. The DNS was classified based on R Mladina classification as Type 1: midline septum or mild deviation, Type 2: Anterior Vertical, C shaped, Type 3: Posterior Vertical, C shaped, Type 4: S-shaped deviation, Type 5: Horizontal spur, Type 6: Horizontal spur with a deep groove on the concave side, Type 7: Combination [9].

*Data analysis*

The data were entered in Micro Soft excel sheet and subjected to statistical analysis using SPSS software version 16. Results were calculated in terms of numbers and percentages.

## RESULTS AND DISCUSSION

Out of the 200 patients studied, the majority of patients were males 132, and 68 were females, accounting for a 1.9:1 ratio. The majority of patients inour study were in the age group of the second to the fourth decade **(Table 1)**.

**Table 1.** Gender and age distribution of the patients.

| The age group of patients in years | Males | Females | Total |
|---|---|---|---|
| 18-28 | 44 | 16 | 60 |
| 29-38 | 24 | 20 | 44 |
| 39-48 | 26 | 14 | 40 |
| 49-58 | 16 | 6 | 22 |

| | | | |
|---|---|---|---|
| 59-68 | 22 | 12 | 34 |
| Total | 132 | 68 | 200 |

The anomaly of DNS was observed in 136 subjects with female predominance, compared to the males **(Table 2)**.

**Table 2.** Frequency and percentage of DNS in terms of gender.

| Changes in the nasal septum | Males *f* and *%* | Females *f* and *%* | Total *f* and *%* |
|---|---|---|---|
| Nasal Septum deviation | 80 (60.6%) | 56 (82.4%) | 136 (68%) |
| No nasal septum deviation | 52 (39.4%) | 12 (17.6%) | 64 (32%) |
| Total | 132 (100%) | 68 (100%) | 200 (100%) |

*Note. f* = Frequency, *%*= Percentage

Based on the Mladina classification, the most common type of deviation in our study was type II, followed by type III, type V, type I, type IV, and type VI **(Table 3)**.

**Table 3.** Mladina classification of DNS in terms of gender and percentage.

| Type of DNS | Males *f* and *%* | Females *f* and *%* | Total *f* and *%* |
|---|---|---|---|
| Type I | 12 (15.0%) | 6 (10.7%) | 18 (13.2%) |
| Type II | 30 (37.5%) | 16 (34.5%) | 46 (33.8%) |
| Type III | 14 (17.5%) | 14 (25%) | 28 (20.5%) |
| Type IV | 8 (10%) | 6 (10.7%) | 14 (10.2%) |
| Type V | 10 (12.5%) | 10 (17.8%) | 20 (14.7%) |
| Type VI | 6 (7.5%) | 4 (7.1%) | 10 (7.3%) |
| Type VII | 0 (0%) | 0 (0%) | 0 (0%) |
| Total | 80 | 56 | 136 |

*Note. f* = Frequency, *%*= Percentage

Out of 136 subjects detected with DNS, 124 subjects were suffering from signs and symptoms of DNS. Nasal obstruction was the most frequent symptom recorded (72.5%), followed by nasal discharge (48.3%), headache (45.1%), and least common smell disturbance (13.0%) **(Table 4)**.

**Table 4.** Signs and symptoms associated with DNS.

| Signs and Symptoms | *f* and *%* |
|---|---|
| Nasal obstruction | 90 (72.5%) |
| Nasal discharge | 60 (48.3%) |
| Headache | 56 (45.1%) |
| Snoring | 36 (29%) |
| Post nasal drip | 36 (29%) |
| Facial pain | 28 (22.5%) |
| Nasal bleeding | 34 (27.4%) |
| Smell disturbance | 16 (13%) |

*Note. f* = Frequency, *%*= Percentage

DNS is defined as the deviation of bone, cartilage, or both from the midline of the face, which causes nasal congestion, discharge, snoring, headache, facial pain, increased nasal airway resistance, and cosmetic problems. Clinically deviated nasal septum can be diagnosed by direct visualization of the septal deviation on physical examination, or with anterior rhinoscopy and nasal endoscopy. Various radiographic techniques are used to assess the DNS like paranasal sinus view, multislice CT, CBCT, and Orthopantomogram radiographs [5]. The use of CBCT for the diagnosis of DNS has shown to be the most accurate, but because of high cost and non-availability in small towns and rural places, orthopantomogram is the most widely used to diagnose DNS.

*Gender distribution*

In our study, out of the 132 males, the DNS was detected in 80 (60.6%) patients, and out of 68 females the DNS was found in 56 (82.4%) patients. There was a high prevalence of DNS among the female population compared to males in our study. The results of our study are following the study conducted by Khojastepour L [11], who observed more DNS among female patients than males. The study conducted by Janovic N using computed tomography found the majority of patients were females accounting for 60.4% when compared with males 39.6% [12]. The study conducted by Taghiloo H and Halimi Z showed a DNS prevalence of 31.7% among males and 56.6% in females in their study [13].

In a study carried out by Shoib *et al*., [14] to analyze the association between symptomatic DNS and sinusitis, there were 112 males and 88 females showing a male predominance which was contradictory to our study. The result of our study was also contradictory to the study by Jadia S, where they showed 68% of males and 32% of females suffered from DNS [15]. The varying results of the prevalence of DNS, in various studies, may be due to the different ethnic origins of the study population.

*Age distribution*

The maximum number of patients in our study were in the second to fourth-decade age group. This may be due to most of the patients visiting our dental hospital being in this age group, with complaints of decayed teeth, unerupted third molar teeth, and gingival diseases.

*Prevalence and types of DNS*

The prevalence of DNS was 68 % in our study; various previous studies have shownvarying results for different populations [12] as shown in **(Table 5)**.

**Table 5.** Prevalence rates of DNS reported in the previous studies.

| | |
|---|---|
| Mamatha H, 2010, [16]. | 65% |
| Khojastepour L *et al*., 2015 [11]. | 49.5% |
| Taghiloo H and Halimi Z, 2019 [13]. | 75% |
| Janovic N, 2020 [12]. | 92.7% |
| Present study | 68% |

In our study we adopted a Mladina classification for DNS classification, according to this classification type II was the most common type followed by type III and type V. The results of our study were in accordance with AL Qahtani's study, where they found type II as the most common type followed by type III [8]. The study conducted by Jadia S, in the Indian population, showed type III was most common followed by type IV, and type V [15]. A study conducted by Shoib *et al*. found that theC-shaped deviation was most common followed by spur impinging on the lateral wall and S-shaped deviation [14]. In a study conducted by Janovic N [12], to assess the relationship between nasal septum morphology and nasal obstruction symptoms using computed tomography, they found type VII, as the most frequent type followed by type V and type III.

*Signs and symptoms associated with DNS*

In our study out of 136 patients detected with DNS, 124 patients were having signs and symptoms like nasal obstruction, nasal discharge, headache, snoring facial pain, nasal bleeding, and smell disturbances

Out of all the symptoms experienced by DNS patients, nasal obstruction was most frequent accounting for 72.5%, followed by nasal discharge at 48.3%, headache at 48.3%, and the least smell disturbance at 13%. The results of our study are in accordance with Abdulwahid S ALQ *et al*. study who concluded that nasal obstruction was the most frequent symptom 92.9%, followed by snoring 67.9%, and nasal discharge 60.7% [8].

According to the study conducted by Jadia S, the most common symptom was nasal obstruction, followed by upper respiratory tract infection and headache [15, 17]. A study by Shoib *et al*. [14], showed headache as the predominant symptom in 186 patients (93%), followed by nasal obstruction in 178 patients (89%), nasal discharge in 126 patients (63%), facial pain in 95 patients (47.5%), fever in 55 patients (27.%), halitosis in 20 patients (10%), cough in 17 patients (8.5%), fatigue in 6 patients (3%).

*Future prospective*

Studies with larger sample sizes and the use of advanced radiographs like cone beam computed tomography and computed tomography with multiple sections to analyze the DNS can be carried out further to authenticate the results of the present study.

## CONCLUSION

Based on the results of our study the prevalence of DNS was more in females compared to males. Type II DNS was most common in the Maharashtra population followed by type III and type V according to the Mladina classification. Nasal obstruction was the most frequent symptom associated with DNS. Early diagnosis and treatment of DNS in an individual will reduce the symptoms and improve the quality of life. Future studies with larger sample sizes are required to support and confirm the findings.

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