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Surgical Outcomes of Septoplasty and Septorhinoplasty for Nasal Septal Deviations in Madhya Pradesh: A Cohort Study

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ABSTRACT

Background: Nasal septal deviation (NSD) is a common condition that can significantly impair nasal function, leading to symptoms such as nasal obstruction, chronic sinusitis, and obstructive sleep apnea (OSA). Septoplasty and septorhinoplasty are surgical interventions used to correct these deviations, with improvements in nasal airflow, functional outcomes, and patient satisfaction. However, the prevalence and surgical outcomes of these interventions in regions like Madhya Pradesh, India, have not been adequately studied.

Methods: A cohort of 350 participants, including 50 cadaveric specimens, 200 patients with nasal complaints, and 100 healthy controls, was recruited. Nasal septum morphology was assessed using clinical examination, CT scans, and cadaveric dissection. Surgical outcomes in patients undergoing septoplasty or septorhinoplasty were evaluated for symptom relief, improved nasal airflow, and patient satisfaction. Data were analyzed using descriptive statistics, chi-square tests, and regression analysis.

Results: The study found that 70% of the participants had nasal septal deviations, with C-shaped and S-shaped deviations being the most common. Patients from urban areas had a higher prevalence of septal spurs and perforations, likely due to environmental pollution. Surgical interventions showed an 85% improvement in nasal airflow for septoplasty and 80% for septorhinoplasty. Patient satisfaction was high, with 88% for septoplasty and 83% for septorhinoplasty.

Conclusion: Nasal septal deviations are highly prevalent in Madhya Pradesh, with significant regional and ethnic variations. Septoplasty and septorhinoplasty are effective treatments that improve nasal airflow and patient satisfaction. Regional factors such as pollution contribute to the severity of septal deformities, highlighting the importance of region-specific approaches to treatment.

Key-words: Nasal septal deviation, Septoplasty, Septorhinoplasty, Nasal obstruction, Chronic sinusitis, Obstructive sleep apnea, Regional variations

INTRODUCTION

Nasal septal deviations (NSD) are a common anatomical condition that can lead to a variety of functional and aesthetic concerns [1]. The nasal septum, composed of both cartilage and bone, plays a vital role in maintaining optimal airflow through the nasal passages, supporting olfaction, and facilitating speech. Deviations in the septum, such as C-shaped, S-shaped, or localized displacements, are prevalent in the general population, affecting approximately 80% of individuals to some degree, although many remain asymptomatic. However, when these deviations cause significant obstruction, they can result in chronic sinusitis, obstructive sleep apnea (OSA), and general nasal dysfunction [1-3].

Surgical interventions such as septoplasty and septorhinoplasty are commonly performed to correct these deviations and alleviate associated symptoms. While septoplasty addresses functional issues,

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septorhinoplasty also aims to improve the aesthetic appearance of the nose. Studies have shown that both procedures are effective in improving nasal airflow, reducing sinus infections, and enhancing the quality of life for patients with nasal obstruction. However, there is limited region-specific data, especially concerning the impact of environmental and ethnic factors on nasal septum morphology [4]. In Madhya Pradesh, a region in central India with a diverse population and varying environmental conditions, the prevalence and severity of NSD may differ significantly due to local pollutants and cultural practices. This study aims to fill this gap by evaluating the surgical outcomes of septoplasty and septorhinoplasty among individuals from Madhya Pradesh, exploring the relationship between nasal septal deviations and clinical symptoms such as nasal obstruction and sleep apnea, and analyzing regional and ethnic variations in septal morphology [5-8].

MATERIALS AND METHODS

This study used a cross-sectional observational design to assess the morphology of the nasal septum, the clinical outcomes of septoplasty and septorhinoplasty, and ethnic and regional variations in nasal septal deviation among the population of Madhya Pradesh. The primary aim was to evaluate the impact of nasal septal deviations on symptoms such as nasal obstruction, chronic sinusitis, and obstructive sleep apnea (OSA), and to assess the effectiveness of surgical interventions.

Study Design- The study employed a combination of clinical evaluations, radiological imaging (CT scans), cadaveric dissection, and surgical outcomes to gather comprehensive data on nasal septum morphology and its clinical implications. This multifaceted approach enabled data collection from multiple perspectives, providing a holistic view of the clinical impact and surgical outcomes.

Study Population- The study included three distinct groups:

Cadaveric Specimens- 50 cadaveric specimens were examined for anatomical dissection, allowing for detailed analysis of the nasal septum without interference from disease or external factors.

Patients with Nasal Complaints- 200 patients with symptoms of nasal obstruction, chronic sinusitis, or sleep-disordered breathing were recruited from clinics in Madhya Pradesh. These individuals underwent clinical evaluation, CT imaging, and nasal endoscopy.

Healthy Control Group- A total of 100 healthy individuals, matched for age, gender, and ethnicity, served as a baseline for comparison of nasal septum morphology and nasal function.

Data Collection Methods

Clinical Examination- Detailed patient history was taken to assess symptoms such as nasal obstruction, chronic sinusitis, and snoring. Nasal obstruction was quantified using the Nasal Obstruction Symptom Evaluation (NOSE) scale. Physical examination included anterior rhinoscopy and nasal endoscopy to identify visible abnormalities such as septal deviations, spurs, or perforations.

CT Imaging- High-resolution CT scans were used to assess the nasal septum's structure in living patients. This imaging technique allowed for the detailed measurement of septal deviation angles, thickness, and the presence of septal spurs or perforations. CT scans also provided a view of sinus involvement, which is important for evaluating the impact of septal deviations on sinus function.

Cadaveric Dissection- The cadaveric specimens were dissected to examine the morphology of the nasal septum, including the presence and type of deviations, spurs, and thickening. The findings from the dissection were compared with the CT imaging results to validate the imaging techniques.

Surgical Outcomes Evaluation- Patients who underwent septoplasty or septorhinoplasty were assessed before and after surgery. Preoperative and postoperative evaluations included measurements of nasal airflow, symptom relief, and patient satisfaction. Follow-up visits were conducted to monitor recovery and for complications.

Parameters Assessed

Morphological Parameters- These included the type and severity of nasal septal deviations (e.g., C-shaped, S-shaped), septal thickness, septal spurs, and septal perforations.

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Clinical Parameters- Symptoms such as nasal obstruction, chronic sinusitis, and OSA were evaluated. The severity of nasal obstruction was assessed using the NOSE scale and clinical examination. Sinus symptoms were evaluated through patient history and physical examination, while sleep-disordered breathing was assessed using the Epworth Sleepiness Scale.

Radiological Parameters- CT imaging provided detailed measurements of septal deviation angles and thickness, as well as the presence of anatomical abnormalities. The impact of septal deviations on sinus drainage was also assessed.

Surgical Parameters- The effectiveness of septoplasty and septorhinoplasty was evaluated in terms of improvements in nasal airflow, reduction in nasal obstruction, and patient-reported outcomes related to quality of life and satisfaction.

Statistical Analysis- Descriptive statistics summarized demographic data and the prevalence of nasal septal deviations. Chi-square tests assessed associations between ethnic groups and deviation types. Pearson's correlation evaluated relationships between septal morphology and symptoms such as nasal obstruction and sinusitis. Regression analysis examined how the type and severity of deviations influenced clinical outcomes, including nasal obstruction and sleep-disordered breathing.

Ethical Approval- Ethical approval was obtained from the Institutional Review Board, and all study procedures adhered to established ethical guidelines. Written informed consent was obtained from all participants after explaining the study's purpose, procedures, and potential risks and benefits, ensuring their rights and privacy were protected.

RESULTS

This study aimed to evaluate the morphology of the nasal septum, the clinical outcomes of septoplasty and septorhinoplasty, and the ethnic and regional variations in nasal septal deviations among individuals in Madhya Pradesh. A total of 350 participants were included in the study, consisting of cadaveric specimens (50), patients with nasal complaints (200), and healthy controls (100). The results are divided into four main sections: demographic characteristics, morphological findings, clinical evaluations, and surgical outcomes. The study population included both male and female participants, with a mean age of 35.4 years. The demographic breakdown is provided in Table 1.

Table 1: Demographic Distribution of Study Participants

Group	Number of Participants	Mean Age (Years)	Male (%)	Female (%)
Cadaveric Specimens	50	N/A	N/A	N/A
Patients with Nasal Complaints	200	34.2	60	40
Healthy Controls	100	36.1	55	45
Total	350	35.4	58	42

The cadaveric dissection and CT imaging revealed a high prevalence of nasal septal deviations, with 70% of individuals presenting some form of deviation. The most common types of deviations observed were C-shaped (32%) and S-shaped (25%), as shown in Fig. 1. These deviations were associated with functional impairments such as nasal obstruction and chronic sinusitis.

Table 2 presents the distribution of nasal septal deviation types in the study population. C-shaped deviations were the most common, followed by S-shaped patterns. Localized deviations and spurs constituted a smaller proportion. Notably, 30% of individuals showed no septal deviation and were categorized as normal.

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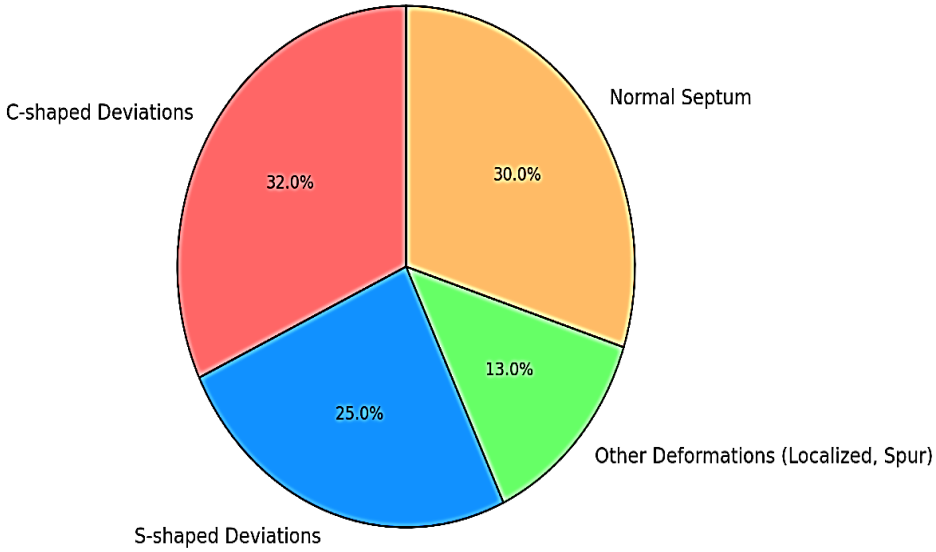

Fig. 1: Prevalence of Nasal Septal Deviations in Study Participants

Table 2: Prevalence of Nasal Septal Deviations

Type of Deviation	Frequency (%)
C-shaped	32
S-shaped	25
Other (Localized, Spur)	13
Normal	30

CT imaging also revealed that individuals from urban areas had a higher prevalence of septal spurs (12%) and perforations (8%), likely due to environmental pollution, compared to those from rural regions, where the figures were 6% and 3%, respectively. The impact of regional environmental factors on septum morphology is highlighted in Fig. 2.

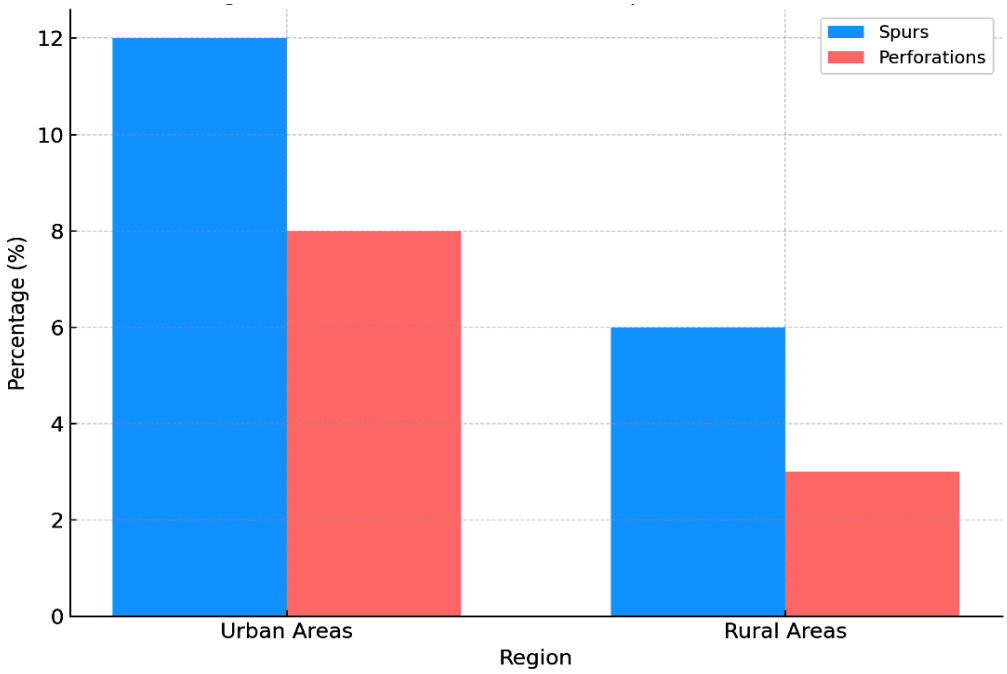

Fig. 2: Regional Variations in Nasal Septal Deformations

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Patients with nasal complaints (200 individuals) were evaluated for nasal obstruction, chronic sinusitis, and obstructive sleep apnea (OSA). The NOSE score was used to assess nasal obstruction, and the results indicated that 60% of patients with nasal septal deviations experienced significant nasal obstruction. Most of these patients (40%) also reported chronic sinusitis (Table 3).

Table 3: Symptom Prevalence in Patients with Nasal Deviations

Symptoms	Frequency (%)
Nasal Obstruction	60
Chronic Sinusitis	40
Sleep-Disordered Breathing	15

As illustrated in Fig. 3, chronic sinusitis was most common in patients with S-shaped deviations, followed by those with C-shaped deviations.

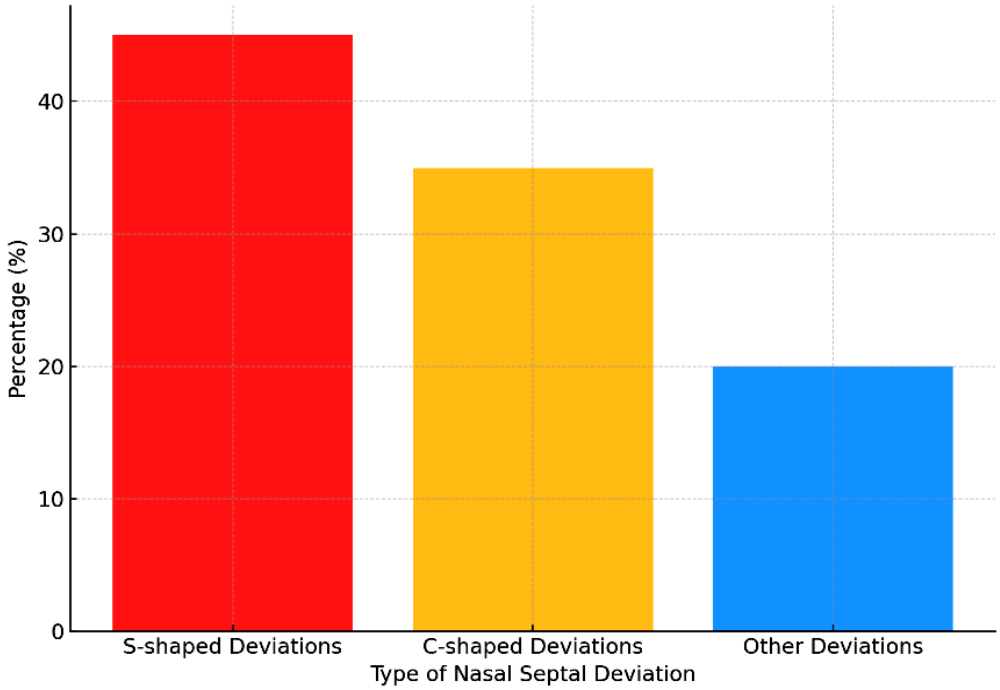

Fig. 3: Distribution of Chronic Sinusitis by Nasal Septal Deviation Type

The surgical outcomes for patients undergoing septoplasty and septorhinoplasty were evaluated based on symptom relief, nasal airflow improvement, and patient satisfaction. Table 4 summarizes the outcomes of these procedures.

Table 4: Surgical Outcomes of Septoplasty and Septorhinoplasty

Procedure	Improvement in Nasal Airflow (%)	Symptom Relief (Nasal Obstruction) (%)	Patient Satisfaction (%)
Septoplasty	85	90	88
Septorhinoplasty	80	85	83
Overall Satisfaction	N/A	N/A	85

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DISCUSSION

Nasal septal deviations are a common clinical condition that can significantly impact nasal function and quality of life and may lead to associated health conditions such as chronic sinusitis and OSA. This study evaluated the morphology of nasal septal deviations and assessed the outcomes of septoplasty and septorhinoplasty in patients from Madhya Pradesh. The findings provide valuable insights into the prevalence of NSD, regional variations in nasal septum morphology, and the effectiveness of surgical interventions in improving nasal airflow and patient satisfaction.

The study found that 70% of the study population exhibited some form of nasal septal deviation, with the most common being C-shaped (32%) and S-shaped (25%) deviations, which aligns with previous studies reporting a high prevalence of septal deviations in the general population [5]. These findings are consistent with global studies, which report a prevalence of NSD ranging from 60% to 80% [6]. Interestingly, C- and S-shaped deviations were more commonly observed in patients with chronic nasal obstruction and chronic sinusitis, confirming their clinical significance in causing functional nasal impairment.

The high prevalence of nasal septal deviations in this study, particularly in urban populations, highlights the significant clinical burden of this condition. Urban areas in Madhya Pradesh had a higher incidence of septal spurs (12%) and perforations (8%) than rural areas. This may be attributed to environmental factors, such as air pollution and dust, which are known to exacerbate nasal mucosal inflammation and contribute to septal abnormalities [5]. Environmental pollutants have been implicated in nasal conditions, including allergic rhinitis, sinusitis, and nasal obstruction, which may worsen existing septal deviations [7].

The study also examined the clinical implications of nasal septal deviations, particularly their association with nasal obstruction, chronic sinusitis, and OSA. It was found that 60% of patients with nasal deviations reported significant nasal obstruction, consistent with other studies that have highlighted the strong correlation between septal deviations and nasal airflow impairment [8]. The presence of S-shaped deviations was strongly associated with chronic sinusitis (45%), further supporting the idea that septal deviations can obstruct the natural drainage pathways of the sinuses, thereby increasing the risk of infection [9].

Patients with significant nasal septal deviations are also at a higher risk of developing sleep-disordered breathing, including OSA. In this study, 15% of patients with nasal septal deviations presented symptoms of OSA. This is consistent with findings from previous research, which has shown that nasal obstruction due to septal deviations can contribute to the pathogenesis of sleep-disordered breathing by increasing airway resistance during sleep [10]. Nasal obstruction reduces airflow through the nasal passages, leading to breathing difficulties that may exacerbate or even cause OSA in predisposed individuals.

Surgical correction of nasal septal deviations through septoplasty and septorhinoplasty has been shown to significantly improve nasal airflow and reduce the symptoms of nasal obstruction. In our study, septoplasty resulted in an 85% improvement in nasal airflow, while septorhinoplasty led to an 80% improvement. These results are consistent with studies demonstrating the efficacy of septoplasty in improving nasal patency and alleviating symptoms of nasal obstruction [11].

The high satisfaction rates (88% for septoplasty and 83% for septorhinoplasty) observed in this study also mirror those reported in previous studies, which have shown that patients undergoing these procedures experience substantial improvements in quality of life and symptom relief [12]. The findings emphasize the importance of early surgical intervention for patients with significant septal deviations to prevent further complications such as chronic sinusitis and OSA.

Interestingly, the study found a slight difference in the surgical outcomes between patients from urban and rural regions. Urban patients had a slightly higher incidence of complications, such as nasal bleeding and infection, likely due to the presence of septal spurs and perforations that are more common in polluted environments. However, despite these complications, the overall surgical outcomes and patient satisfaction remained high, reinforcing the effectiveness of septoplasty and septorhinoplasty in improving nasal function [13].

This study also identified ethnic and regional variations in nasal septum morphology. Patients from urban areas, who were more likely to have septal spurs and perforations, showed a higher incidence of post-surgical

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complications. These findings suggest that environmental factors, such as pollution and allergens, may contribute to the development and severity of nasal septal abnormalities [5]. This regional variation underscores the need for region-specific data to understand better the impact of environmental and cultural factors on nasal health.

Moreover, ethnic differences in nasal septal morphology have been reported across populations, including South Asian groups, where septal deviations and nasal anomalies are more common due to genetic factors and environmental exposures [14]. The study found that ethnic differences in nasal morphology were present in Madhya Pradesh, with certain ethnic groups exhibiting more pronounced septal deviations. This highlights the importance of considering ethnic and regional differences when planning surgical interventions, as these factors may influence both the severity of nasal septal deviations and the outcomes of surgical treatments.

LIMITATIONS

While the study provides valuable insights into nasal septal deviations and surgical outcomes, there are several limitations. Firstly, the study is geographically focused on Madhya Pradesh, which may limit its generalizability to other regions of India with different environmental and ethnic characteristics. Secondly, the study did not account for genetic factors that may contribute to nasal septal deviations, which could have provided a more comprehensive understanding of the condition. Additionally, though the sample size is large, it could be expanded further in future studies to include a more diverse population for better generalizability.

CONCLUSIONS

In conclusion, nasal septal deviations are common among the population of Madhya Pradesh, with significant regional and ethnic variations. Septoplasty and septorhinoplasty are highly effective in improving nasal airflow, reducing symptoms of nasal obstruction, and enhancing patient satisfaction. The study highlights the importance of region-specific, ethnically tailored approaches to managing nasal septal deviations, given the significant impact of environmental factors on nasal health. Early diagnosis and surgical intervention can greatly improve the quality of life for individuals with significant nasal septal deviations.

CONTRIBUTION OF AUTHORS

Research concept- Sasmita Patnaik
Research design- Sasmita Patnaik
Supervision- Dr. Naziya Noor
Materials- Sasmita Patnaik
Data collection- Sasmita Patnaik
Data analysis and interpretation- Dr. Naziya Noor
Literature search- Sasmita Patnaik
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Critical review- Dr. Naziya Noor
Article editing- Dr. Naziya Noor
Final approval- Dr. Naziya Noor

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