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ORIGINAL ARTICLE

Deviated Nasal Septum and Its Association with Other Pathologies

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ABSTRACT

Objectives:
This study addresses the frequency of a deviated nasal septum and discusses the relation to multiple diseases: chronic rhinosinusitis, obstructive sleep apnea, and allergic rhinitis. All these relationships impact on management and thus need to be taken into account within clinical practice.

Methodology: In our retrospective study conducted from 1st January, 2021 to 28th February, 2024 in a private clinic/ hospital of Sialkot, where we included 300 patients aged between 18 and 65 years who presented with symptoms of nasal obstruction that were evaluated for DNS and associated conditions based on their clinical exams and CT scans. Those exams were scored using standardized scales to measure the severity.

Results: We have found DNS to occur with high prevalence among patients of nasal obstruction and is very strongly related to chronic rhinosinusitis in 11.7% and nasal polyps in 16.3%. The most common complaint presented was nasal obstruction, with complaints of nasal obstruction being presented by 35% of the participants, especially males in the allergic condition of rhinitis.

Conclusion: Our results agree with the international data that DNS was responsible for many pathologies of the nose and paranasal areas. We also mention very minimal regional variations regarding gender impact on observed allergic rhinitis and loss of smell.

Keywords: Deviated nasal septum, nasal obstruction, chronic rhinosinusitis, allergic rhinitis, sleep apnea, nasal polyps, turbinate hypertrophy.

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Introduction

The deviated nasal septum is a pathological condition wherein the septum of the nasal cavity is displaced off the median plane. This condition may manifest clinical signs that include nasal airway obstruction, pathological breathing and chronic nasal congestion. Though a certain number of the patients with DNS never suffer any discomfort, most of such patients must suffer from serious conditions that call for treatment. DNS is present more often, and it can be caused by congenital changes in the spine, injury, or simply developmental dysplasia[1].

The nasal septum is one of the most important structures governing the functions of the nasal cavity. Sometimes, its slightest shift can negatively affect the function of the nasal passage and become a etiological factor in other pathology, the obstructive symptoms of which are a direct result of its position. It has previously been linked to many respiratory and sinonasal disorders such as chronic rhinosinusitis[2], obstructive sleep apnoea[3] and allergic rhinitis[4]. These associations underscore the importance of an extensive assessment of DNS in patients with related manifestations.

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Besides respiratory effects, DNS has been implicated in migraine and other chronic headaches. Compensatory mechanisms for the mechanical obstruction by a deviated septum might be the primary precipitating contributor to headache on account of the pressure variations in the nasal passages and inflammation. There is increasing evidence to suggest that DNS may also be associated with middle ear dysfunction due to the anatomical connection of the nasopharynx and Eustachian tube[5].

Septoplasty that is the surgery to fix DNS is used to treat the symptoms and improve quality of life of the individuals. The presented studies of septoplasty shows its efficiency in the treatment of DNS [6]. This work will also involve a systematic and critical evaluation of DNS in relation to other pathologies, as well as an overview of DNS clinical significance.

DNS is commonly seen in patients with chronic rhinosinusitis (CRS) being one of the most commonly coexisting conditions. DNS encourages turbinate tissue to block air passage into the nasal cavity which in turn harms the mechanism of draining paranasal sinuses and encourages sinusitis.

Investigators have reported that DNS patient experience chronic rhinosinusitis or recurrent particularly when the extent of the deviation causes ostium obstruction.

Another study by Watters et al demonstrated that moderate to severe DNS places patients at risk of developing CRS due to persistence of inflammation and impaired mucociliary clearance within the sinonasal mucosa[7]. Another survey done by CT scans in analysing the nasal and paranasal framework also identified a high correlation of DNS with chronic rhinosinusitis[8].

Furthermore, Rajneesh et al. opined that DNS could worsen the severity of rhinosinusitis in patients with prior sinus pathologies[9].

DNS and Sleep-Related Breathing Disorders;

DNS has been found linked with sleep related breathing disorders, including Obstructive Sleep Apnoea (OSA). OSA is defined by multiple episodes of partial or total upper airway obstruction during sleep. Several researches have established DNS as a predisposing factor for sleep apnoea, more through an obstruction in the airflow within the nasal passage which offers more resistance and at time collapses during sleep. The authors Acar et al. investigated on the DNS patients and concluded that the extent of the septal deviation is determined to predict the severity of snoring and apnea in these patients[10].

Drawing similar findings to previous studies, the study carried out showed that reduction of the nasal obstruction through septoplasty could lower the levels [11].

In another cross-sectional study by Kemke et al it was also noted that DNS patients were more likely to snore and be sleepy during the day, which are consistent markers of OSA[12].

DNS and Allergic Rhinitis

Allergic rhinitis (AR) is another well-established condition which has been associated with DNS. AR is characterized by nasal obstruction, sneezing, and nasal discharge mainly induced by allergens in the environment. AR and DNS are two different diseases, but the interaction of both diseases intensifies the symptoms of this nasal obstruction. Persistent alterations in nasal airflow and mucociliary clearance induced by DNS can lead to more severe manifestations of AR compared with a healthy population. Another prospective cohort study by Kim et al. discovered that the severity of DNS was directly associated with AR symptom worsening, as patients complained of nasal stuffiness and shortness

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of breath[13]. Furthermore, when DNS is associated with allergic patients, severe symptoms tend to manifest, and treatment is complications intensified[14].

Research indicates that correction of the structural definitively through septoplasty might assist in the reduction of some of the manifestations of AR most notably nasal airway obstruction and postnasal drip.

DNS and Headaches

Besides, respiratory related pathologies DNS has been accredited for chronic headache disease. Congenital anatomical abnormalities of the nasal cavity can injure the face and result in headaches or migraines due to mechanical blockage of nasal septum. Lin et al., in their systematic review on DNS, used chronic headache as a complaint in patients diagnosed with the condition. The study showed that most of these patients had improvement after septoplasty and nasal obstruction could have been the cause of their headaches[15]. A study by Andrews et al. suggested that the inflammation of the nasal mucosa, due to DNS, may cause headaches through the sensitisation of the trigeminal nerve endings localized in nasal mucosa[16]. How this works is still poorly understood but there seems to be general agreement that correcting DNS is a potentially beneficial treatment for patients complaining of headache due to nasal obstruction.

DNS and Middle Ear Pathologies;

DNS has also been related with middle ear pathologic conditions, specifically Eustachian Tube Disorder (ETD). The Eustachian tube is a passageway connecting nasopharynx to the middle ear; facilitates changes in pressure. As in DNS patients, the nasal obstruction leads to inadequate aeration of the middle ear and ETD, as well as to otitis media a positive correlation between DNS and recurrent otitis media in both children and adult patients, due to the obstructive pathophysiology of DNS on eustachian tubes. It has been determined that Septoplasty cures DNS by improving middle ear ventilation, further decreasing the occurrence of ear infections and other pathological processes in the middle ear.

Deviated Nasal Septum (DNS) with Turbinate Hypertrophy

Deviated nasal septum (DNS) and turbinate hypertrophy often coexist, contributing to chronic nasal obstruction. Turbinate hypertrophy refers to the enlargement of the nasal turbinates, which are responsible for humidifying and filtering air as it passes through the nasal cavity. When DNS is present, it often causes a compensatory hypertrophy of turbinates on the opposite side of the deviation to maintain airflow balance. This hypertrophy exacerbates nasal blockage, further compromising airflow and contributing to symptoms such as the nasal congestion, difficulty in breathing, and the snoring.

The combination of DNS and turbinate hypertrophy can lead to chronic rhinitis and recurrent sinus infections due to inadequate drainage and airflow through the nasal passages. Treatment often involves surgical intervention, where septoplasty is combined with turbinate reduction (turbinate resection or radiofrequency ablation) to relieve nasal obstruction and improve breathing. Research shows that addressing both conditions surgically results in a higher success rate in alleviating symptoms than treating DNS alone[17].

Deviated Nasal Septum (DNS) with Nasal Polyps

DNS is also commonly found in conjunction with nasal polyps, which are non-cancerous growths that develop on the lining of the nasal passages or sinuses due to chronic inflammation. The presence of DNS can exacerbate the symptoms caused by nasal

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polyps, such as nasal obstruction, loss of the smell (anosmia), the postnasal drip, and the recurrent sinus infections. The obstruction caused by DNS creates a favourable environment for inflammation, further promoting the growth of nasal polyps. Nasal polyps themselves may worsen the blockage caused by DNS, resulting in severe nasal congestion.

Management of DNS with the nasal polyps often involves both medical and surgical approaches. Medical treatments, such as corticosteroids, help reduce the size of the polyps and inflammation. In cases of severe obstruction, functional endoscopic sinus surgery (FESS) is often performed alongside septoplasty to remove the polyps and correct the deviated septum, restoring proper nasal function and airflow. Studies indicate that combined surgical treatment for both DNS and nasal polyps is effective in reducing nasal obstruction and improving the quality of life for patients[18].

Objectives

- The major purpose of this study is to evaluate the frequency of deviated nasal septum (DNS) and its connection with different nasal and paranasal illnesses.
- Specifically, this research intends to analyse the frequency of DNS among the study population and identify the most prevalent clinical manifestations and symptoms, such as nasal obstructtion, chronic nasal congestion, and sinusitis, that may be connected to DNS.
- Furthermore, the study will examine the association between DNS and the frequency of other anatomical abnormallities, such as turbinate hypertrophy, nasal polyps, and functional concerns including reduced nasal airflow.

In addition, this research will evaluate the wider effect of DNS on quality of life, including its possible involvement in contributing to sleep problems, snoring, and headache or face pain syndromes. By evaluating these correlations, the study intends to give insights into the full consequences of DNS on respiratory health and general well-being, perhaps directing future treatment options.

Methodology

Study Design; This research adopts a retrospective study aimed at exploring the association of a deviated nasal septum (DNS) with ENT pathologies A hospital/ clinic based sample of patients presenting with nasal obstruction was selected. All participants were clinically assessed for DNS, turbinate hypertrophy and the nasal polyps and several other pathologies. This methodology section details the steps taken for participant selection, diagnostic criteria, and data analysis.

Participants; The study included patients aged 18 to 65 years who presented with the symptoms of nasal obstruction at otolaryngology department of hospital.

Patients with the previous nasal surgeries, trauma, or congenital nasal deformities were excluded from the study. A total of 300 participants were enrolled, divided into three groups: those with DNS and turbinate hypertrophy, those with DNS and nasal polyps, and a control group with only DNS.

Ethical Considerations; The study was conducted following the Declaration of Helsinki guidelines and received approval from the hospital's ethical review board. Written informed consent was obtained from all participants before enrolment.

Data Collection

Clinical Examination; All participants underwent a detailed clinical examination by an otolaryngologist. DNS was diagnosed

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based on anterior rhinoscopy and confirmed through nasal endoscopy. The degree of the deviation was categorized into moderate, mild and severe using standardized angles of deviation.

Turbinate hypertrophy was diagnosed based on visual assessment of the inferior turbinate size during nasal endoscopy and using objective measures like acoustic rhinometry to assess nasal volume and cross-sectional area.

Nasal polyps were diagnosed through nasal endoscopy, with findings confirmed by the computed tomography (CT) scans when necessary. The size and extent of polyps were graded according to the Lund-Kennedy scoring system.

Imaging; CT scans of the paranasal sinuses were performed for patients with suspected turbinate hypertrophy and nasal polyps. This imaging modality provided a detailed view of the nasal cavity and sinus anatomy, helping to assess the severity of DNS, the size of hypertrophied turbinates, and the extent of nasal polyps.

Symptom Evaluation; Participants were asked to complete the Nasal Obstruction Symptom Evaluation (NOSE) scale to assess the severity of their nasal obstruction symptoms. The Sino-Nasal Outcome Test (SNOT-22) was also used to evaluate the impact of DNS and related pathologies on quality of life.

Data Analysis

Associated Pathologies	Females	Males	Total No of Patients
DNS only	60	65	125
DNS + Sinusitis	20	15	35
DNS + Nasal polyps	26	23	49
DNS + Turbinated Hypertrophy	15	5	20
DNS + Allergic Rhinitis	9	35	44
DNS + Others	10	17	27

Table 1

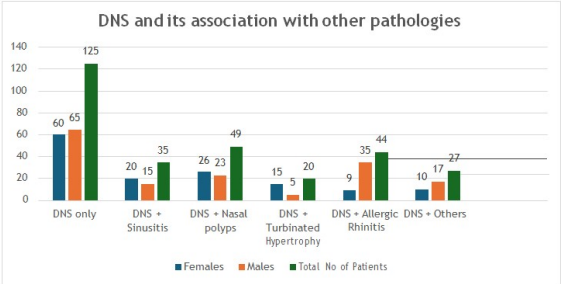

Table 2

Symptoms	Females	Males	Total No of Patients
Nasal Obstruction	50	55	105
Nasal Discharge	45	40	85
Headaches	15	20	35
Epistaxis	20	15	35
Loss of smell	10	30	40

Table 3

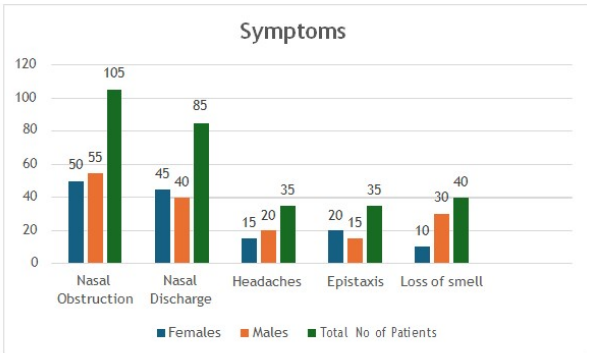

Table 4

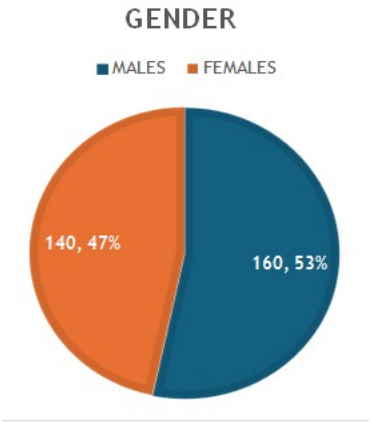

Table 5

Deviated Nasal Septum and Its Association with Other Pathologies

Statistical Methods; Data were analysed using IBM SPSS version 26. Descriptive statistics were employed to summarize the demographic data, including age, gender, and symptom severity scores.

Discussion

Comparative Discussion with International Studies:Prevalence of DNS and Associated Pathologies: Our result that DNS alone is the most frequent ailment is consistent with another worldwide research. For instance, research done by Subramanian et al[20] indicated that DNS was present in roughly in 60% of general population, with differences in the kind of deviation and concomitant diseases such sinusitis and nasal polyps. Our data indicates 125 incidents of DNS alone, which makes up around 42% of the overall cases. This comes in line with research identifying DNS as a frequent nasal pathology or finding.

The link between DNS and sinusitis in our study (11.7% of total patients) similarly mirrors research by Mladina et al[21] which indicated that DNS commonly leads to chronic sinusitis owing to the decreased drainage of sinuses. Their research indicated a 15-20% association between DNS and sinusitis. Our data suggests a somewhat lower frequency of DNS with sinusitis (11.7%), presumably owing to variations in geographic and environmental variables across populations.

The relationship of DNS with nasal polyps, found in 16.3% of our patients, is similar with results by Soler et al[22] who identified DNS as a contributing factor to formation of nasal polyps in roughly 15-18% of patients. Polyps, being an inflammatory illness, frequently coexist with DNS owing to prolonged inflammation. Our data is within the spectrum of worldwide research, supporting the association between DNS and chronic inflammatory nasal diseases such nasal polyps.

Our data demonstrates a high male predisposition for DNS related with allergic rhinitis, with 35 men afflicted compared to just 9 females. Research by Berger et al[23] also indicates a substantial relationship between DNS and allergic rhinitis, especially in younger male populations due to increased environmental exposure and the genetic propensity. Our research reveals a more prominent gender difference than the international studies, potentially suggesting local environmental or genetic factors driving the male-dominated instances of DNS with allergic rhinitis.

Loss of smell in nasal obstruction is the most prevalent symptom in our data in 35% of patients, is also described as the predominant complaint in patients with DNS by Holmström et al[24] where the nasal obstruction affected 40-50% of patients. However, loss of smell is more prevalent in males in our research, is also substantiated by worldwide studies that demonstrate olfactory impairment is more commonly observed in men with DNS. Both data and worldwide studies agree that nasal obstruction is the major symptom, whereas loss of smell tends to show a gender bias towards men, indicating hormonal and anatomical variations.

Conclusion:

The results from our dataset correspond well with worldwide studies on the incidence and relationships of DNS with other ENT-illnesses.

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