"NASAL ENDOSCOPIC EVALUATION OF PATIENTS PRESENTING WITH FRONTAL HEADACHE"

By

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Dissertation submitted to

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION & RESEARCH, TAMAKA, KOLAR, KARNATAKA

in partial fulfillment
of the requirements for the degree of

Master of Surgery

in

OTORHINOLARYNGOLOGY

under the guidance of

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Date

Place **Dr .Lakshmi Menon.R**

LIST OF ABBREVIATIONS USED

ARS :	Anterior rhinoscopy
DNE.:	Diagnostic Nasal Endoscopy
CT.:	Computed Tomography
PNS:	Paranasal Sinus
DNS:	Deviated nasal septum
ITH:	Inferior Turbinate Hypertrophy
MTH:	Middle Turbinate Hypertrophy
CRS:	Chronic Rhinosinusitis

ABSTRACT

Background: Headache is an universal symptom affecting most people at some point in their lifetime. The most common cause of headache in ENT is acute sinusitis or an acute exacerbation of chronic sinusitis. Anatomic variations like a massive concha bullosa, enlarged ethmoidal bulla, laterally rotated uncinate can interfere with mucociliary clearance. Thus a thorough Nasal Endoscopic evaluation will help us to detect any anatomic abnormality which may predispose to sinogenic headache.

Objective: This study was carried out to find out the endoscopic findings in patients presenting with frontal headache to ENT OPD of R. L. Jalappa Hospital and to assess the clinical impact of endoscopic evaluation in the nose and their relation to clinical symptoms.

Methods: 100 patients with frontal headache underwent Diagnostic Nasal Endoscopy and all anatomic variations and pathological abnormalities were noted.

Results: 83 % cases had a diagnosis of DNS or Rhinosinusitis, and the rest 17 % had non sinonasal cause for headache.

Interpretation and conclusion: Anatomic abnormalities like middle turbinate anamoly, spur, enlarged bulla, hyperplastic uncinate and pathological abnormality like mucopurulent discharge, polypi can be diagnostic of sinogenic cause for frontal headache.

Key words: Frontal Headache, Diagnostic Nasal Endoscopy

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INTRODUCTION

Headache is an universal symptom affecting most people at some point in their lifetime.[1] Around 90% suffer from headache over a 12 month period. Headache or cephalalgia is defined as diffuse pain in various parts of the head with pain not confined to the area of the distribution of any particular nerve.[2] A multidisciplinary approach is required to diagnose the causative factors of headache.[3]

The most common cause of headache in ENT is acute sinusitis or an acute exacerbation of chronic sinusitis.[4]Anterior rhinoscopy with a nasal speculum and headlight allows visualization of only septum and anterior portion of the inferior turbinate , while the rest of the nasal cavity remains obscure.[5]

Hence, a Nasal endoscopy is mandatory in the diagnosis of sinusitis. A normal nasal cavity, showing no evidence of middle meatal mucopus or inflammatory changes makes a diagnosis of sinogenic pain most unlikely.[6]

Rhinosinusitis affects more than 16% of the adult population annually. It is defined as inflammation of nasal and paranasal sinus mucosa. Computerised tomography of the paranasal sinuses is used in the diagnosis of chronic rhinosinusitis. There is a high correlation between the endoscopic findings and CT examination.[7]

Anatomic variations like a massive concha bullosa, enlarged ethmoidal bulla, uncinate rotated laterally can interfere with mucociliary clearance. [5]

Hence this study aims to find out the endoscopic anatomical variations & their significance in patients with frontal headache.

OBJECTIVES

1. To study the endoscopic findings in patients presenting with frontal headache at ENT OPD of R.L. Jalappa hospital.

2. To record the anatomical findings and find out the clinical impact of the endoscopic evaluation in the nose and their relation to clinical symptoms.

REVIEW OF LITERATURE

HISTORICAL PERSPECTIVE

Throughout the history of medicine, numerous attempts have been made to illuminate and examine the inside of various hollow cavities in our body. The interior of nose and paranasal sinuses, with their narrow passages and fissures, bony walls, places heavy demands on the design of instrumentation to be used for this purpose. This sowed seed for development of the nasal endoscopy.[8]

In 1915, Killian published a review of the "History of endoscopy, from the earliest times to Bozzini", in which he recorded all the attempts to view the upper airways prior to beginning of 19th century. Philip Bozzini, in 1806 published an article describing the first "Light conductor, or description of a simple device and its use for the illumination of the internal cavities and spaces of live animal body".[8]

Bozzini mentioned in 1806 that he was able to see some areas behind soft palate with the aid of his light conductor. In 1838, Baumes presented to Medical Society in Lyons, a mirror, the size of two Franc piece that could be used for the examination of choanae and the larynx.[8]

In 1859 in Vienna, Czermak developed a technique similar to laryngoscopy of Turck, which allowed him to view the nasopharynx, the choanae and posterior aspect of nose with aid of a small mirror. He called this procedure 'Rhinoscopy '.[8]

The second stage of cystoscopy began with the development of cystoscope by Nitz-Leiter in 1879. A year later Zauful modified the instrument for examining Eustachian tube orifice.[8]

In 1902, Hirschmann and Valentin followed shortly by Reichert, in 1903, were able to introduce a modified cystoscope directly into maxillary sinus through an enlarged dental alveolus.[8]

During 1951-56, Hopkins made fundamental improvements in the optics of endoscopy. These included a light source that was separate from the instrument, an excellent resolution, with high contrast, a large field of vision in spite of the small diameter of the endoscope, and perfect fedility of colour.[8]

The Hopkins rod rigid nasal endoscopes made it possible to examine in detail the clefts and recesses of the nose. The ability to enter middle meatus of the nose enabled the inspection of anterior ethmoid sinuses, key area of infectious paranasal sinus disease. Today, nasal endoscopic examination in combination with tomography allows the identification of small, circumscribed changes in paranasal sinuses. These small changes are frequently of considerable pathophysiologic significance.[8]

Messerklinger was the first to develop and establish a systemic endoscopic diagnostic approach to the lateral wall of nose. His studies beginning in 1950, demonstrated that, in most cases the frontal and maxillary sinuses are involved indirectly by primary disease that originates in narrow spaces of lateral wall of nose and in the anterior ethmoid. This discovery led to the development of endoscopic diagnostic technique that focussed on changes on the lateral wall of nose and identified and isolated changes, with the aid of rigid endoscope and tomography of sinuses. Messerklinger observed that the eradication of primary anterior ethmoid disease by means of a circumscribed, limited endoscopic surgical procedure resulted in the recovery of massive mucosal pathology, in the adjacent, large paranasal sinuses, within a few weeks.[8]

ANATOMICAL AND PHYSIOLOGICAL CONSIDERATION

EMBRYOLOGY OF NOSE

Nasal Cavity is first recognized in the 4th week as the olfactory or nasal placode. The placode sinks to form the olfactory pit. This then deepens to form the nasal sac. The maxillary process of the 1st arch grows anteriorly and medially to fuse with nasal fold and frontonasal process. This closes off the nasal pits to form the primitive nasal cavity.[9]

Initially mouth and primitive nasal cavity are separated by bucconasal membrane. This thins as nasal sac extends posteriorly and eventually breaks down to form the primitive choana. The floor anterior to the choana is formed from mesenchymal extensions of medial nasal folds to produce premaxilla which gives rise to the upper lip, medial crus of lower lateral cartilages. [9]

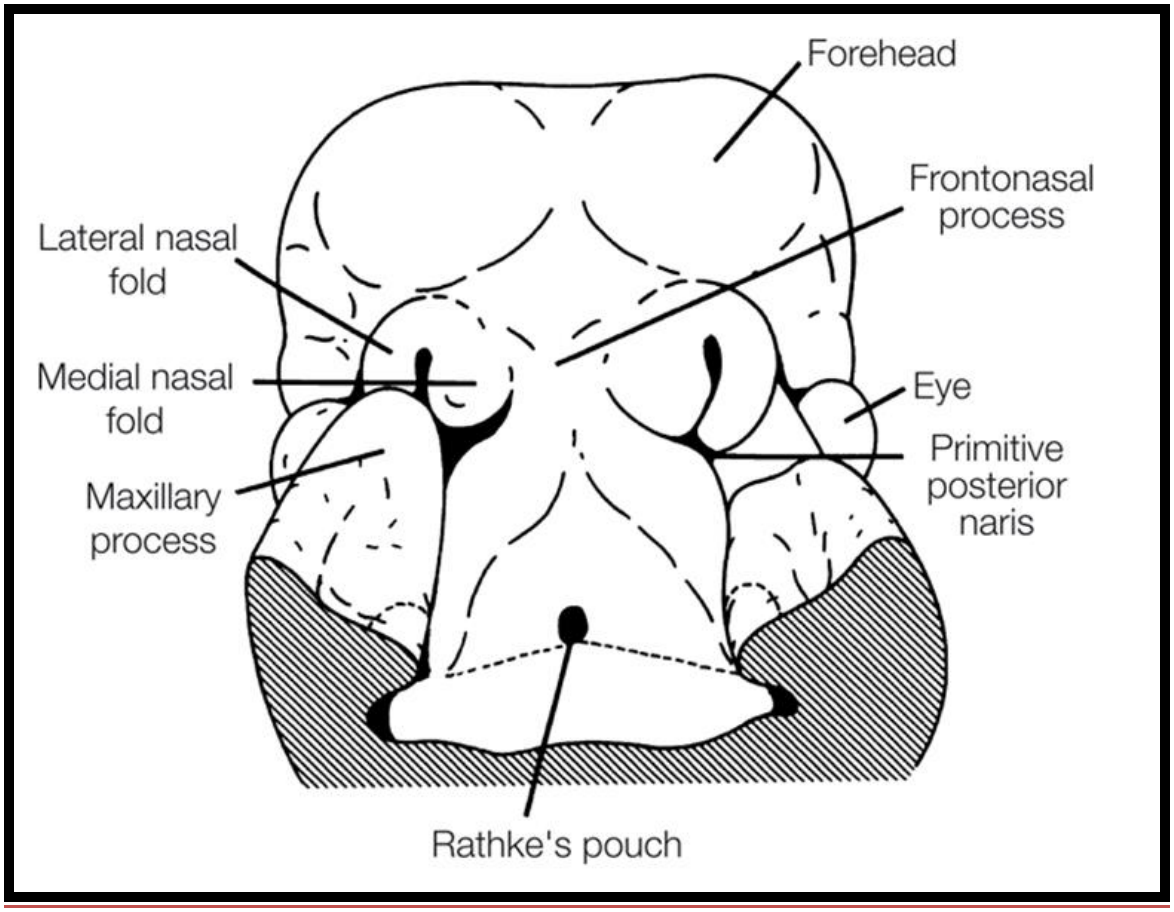
The maxillary process also grows ventrally from dorsal end of mandibular process to join the lateral nasal process around the nasomaxillary groove. The ectoderm in this region canalizes to form the nasolacrimal duct.[64]

The lateral nasal folds form the nasal bones, upper lateral cartilages, and lateral crus of lower lateral cartilage.

Palate begins to form anteriorly with fusion of the maxillary and frontonasal processes. Nasal septum is formed from the midline ridge developing from the posterior edge of frontonasal process in roof of oral cavity and extends posterior to the opening of Rathke's pouch.[9]

The palatal process from lateral maxillary mesoderm grows medially towards septum and towards each other. Fusion is complete except a midline dehiscence which forms site of future incisive canal. It separates the nasal cavity and nasopharynx from oral cavity as they also form soft palate and uvula.[9]

Figure 1: showing development of the nose



ANATOMY OF NOSE

EXTERNAL NOSE :

The external nose is shaped like a triangular pyramid with its root above and base directed downwards. The base is perforated by two nostrils or anterior nares, separated by median septum. Each side of external nose ends in a rounded eminence, the alae nasi, which forms the outer boundary of the nostril. The nasal bones form the bridge, and each is united above with frontal bone and laterally to frontal process of maxilla. Two paired cartilages, the upper and lower lateral cartilage and one unpaired cartilage, the septal, complete the external framework[9].

The chief muscles acting of external nose are the compressors and dilators of ala nasi supplied by facial nerve.[62]

Blood supply to the external nose is from maxillary and ophthalmic arteries. The anterior facial vein and ophthalmic vein forms the venous supply, lymphatics drain into the submandibular and pre-auricular lymph nodes.

The skin of the external nose receives its sensory supply from the two upper divisions of the trigeminal nerve; ophthalmic and maxillary.[9]

NASAL CAVITY :

Each nasal cavity is divided into three parts i.e. nasal vestibule, olfactory region and respiratory region. Nasal vestibule is most anterior and it extends from the nostril anteroinferiorly to the nasal valve posterosuperiorly. The nasal valve is situated between caudal end of upper alar cartilage laterally and septum medially. The area of demarcation is limen nasi, with skin containing hair follicles, sebaceous and sweat glands. It is a space of importance since it is here that the nasal cavity is the narrowest, limited to a triangular shape of only 0.3 cm^2 on each side. [9]

The olfactory region is confined to the upper part of the nasal cavity and the superior turbinate representing an area of 10 cm^2. The rest of the nasal cavity constitutes the respiratory region and its surface may reach 120 $cm^{2.}$

The lateral wall of each nasal cavity has superior, middle and inferior turbinates. Each turbinate overhangs a meatus. The space above or medial to superior turbinate is sphenoethmoidal recess, to which sphenoidal sinus open. Posterior ethmoidal cells drain into superior meatus. The anterior ethmoidal, frontal and maxillary sinuses open into middle meatus. The nasolacrimal duct opens into inferior meatus.[10]

Middle meatus contains several structures of importance. An enlargement is found at anterior end of the middle meatus, which is part of ethmoidal bone, called as the uncinate process. A little further back is another eminence which is called bulla ethmoidalis, which represents a protrusion into the meatus of one of the air cells of the ethmoidal labyrinth. [9] Between these two enlargements is a groove which is known as hiatus semilunaris, which leads to a narrowing called infundibulum[9].

Arterial supply is via the lateral branches of sphenopalatine, greater palatine, superior labial, anterior and posterior ethmoidal arteries. Venous drainage occurs to pterygoid plexus. Lymphatics drain into the submandibular nodes anteriorly and to the lateral pharyngeal, retropharyngeal and upper deep cervical nodes posteriorly.

Main sensory supply to the nasal cavity is derived from the maxillary division of the trigeminal nerve through branches arising in pterygopalatine ganglion. The lateral and medial internal nasal branches of the ophthalmic nerve supply anterior part of the nasal cavity while floor and anterior end of middle turbinate supplied by the anterior dental branch of the infraorbital nerve.[9]

Sympathetic nerve supply arises from the superior cervical ganglion. It produces vasoconstriction and decreased secretion from the nose. Parasympathetic supply arises from the pterygopalatine ganglion via nerve to pterygoid canal. It produces vasodilation and increased secretion.[9]

NASAL SEPTUM :

The nasal septum is formed by the perpendicular plate of ethmoid, the vomer, septal cartilage, nasal crests of the maxillary and palatine bones. The main arterial supply of the nasal septum arises from the septal branch of sphenopalatine artery. The antero-inferior part of the septum or Little's area is where the septal branches of sphenopalatine, greater palatine, superior labial and anterior ethmoidal artery anastomose. Venous drainage occurs to pterygoid plexus. The anterior septum drains in to the submandibular nodes while posterior drains in to the retropharyngeal and anterior deep cervical nodes. The nerve supply is by nasopalatine nerve posteriorly and anteriorly by the anterior ethmoidal branch of nasociliary nerve and anterosuperior alveolar nerve.[9]

Figure 2 a: showing nerve supply to the nasal septum

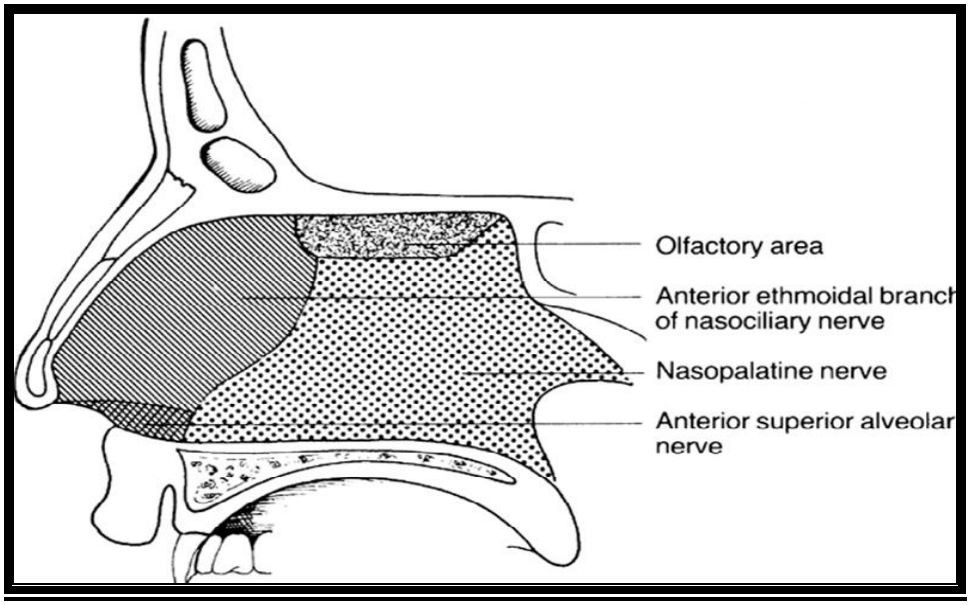
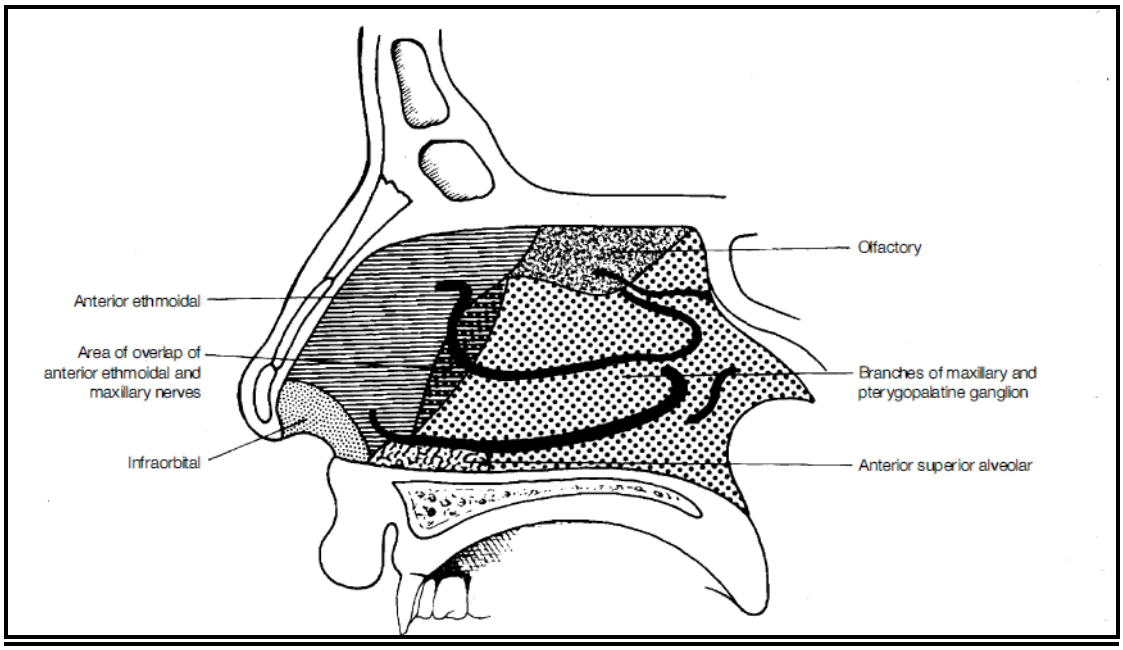


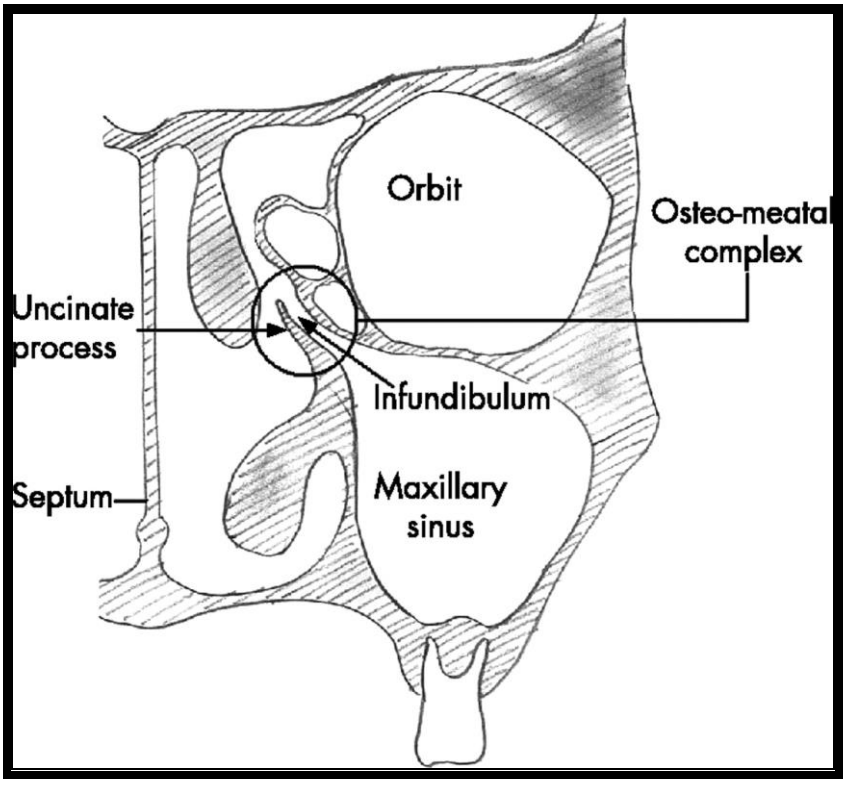
Figure 2 b: showing nerve supply to the lateral wall of the nose



OSTEOMEATAL COMPLEX :

Neuman coined this word to describe the region comprising middle meatus with the anterior air cells. This is the most important area for normal sinus functioning and any pathology in this area will disrupt the physiology and leads to sinus dysfunction. In the middle meatus there are several important structures. Anteriorly, the first landmark is a hook shaped bone called uncinate process. Posterior to uncinate process is a groove known as hiatus semilunaris which leads to ethmoidal infundibulum. The ethmoidal bulla is a bulge posterior to the hiatus, which is a part of anterior ethmoidal group of cells. The frontal sinus opens into the superior most aspect of the ethmoidal infundibulum called the frontonasal recess, while the anterior ethmoidal cells open into the infundibulum. The osteum of the maxillary sinus opens posteroinferiorly into the infundibulum[9,10.]

Figure 3: showing Osteomeatal Unit of the lateral wall of nose



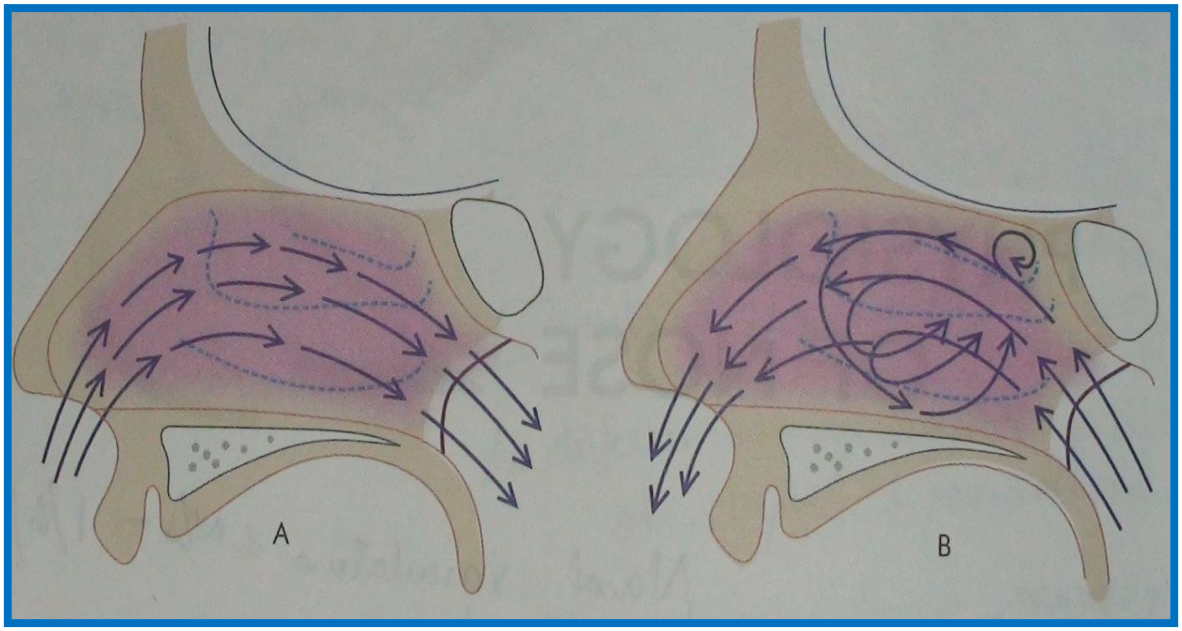
PHYSIOLOGY OF NOSE

The chief functions of nose are respiration and olfaction. In addition to being the sensory organ of smell, the nose also plays an important role in the cleansing and conditioning of inspired air. It also contributes to heat exchange, humidification, filtration, nasal resistance, nasal fluids and ciliary function, voice modification and the nasal neurovascular reflexes.[11]

Filtration: is accomplished by the nasal mucous blanket which covers the mucosal membrane and is constantly propelled posteriorly by the cilia. Mucous blanket is adhesive and causes the bacteria and dust to adhere to it.[11]

Olfactory: The direction of air currents ensures that airborne odourous substances reach olfactory area, to enhance the sense of smell[11].

Figure 4: showing air currents during inspiration and expiration



(A) Inspiration (B) Expiration

EMBRYOLOGY OF PNS

MAXILLARY SINUS :

The maxillary sinus is the first sinus to appear at seven to ten weeks as a shallow groove expanding from the primitive ethmoidal infundibulum into the mass of the maxilla. It continues to grow during childhood at an estimated annual rate of 2 mm vertically and 3 mm anteroposteriorly and in particular with development of the middle third of the face as the dentition erupts. It reaches its final size in the seventeenth to eighteenth year of life. The maxillary sinus in an adult has a volume of around 15 cm^2 and is roughly pyramid shaped. The base of this pyramid is formed by the medial wall of the maxillary sinus with the apex of the pyramid towards the zygomatic recess.[9,65]

ETHMOID SINUS:

At 9^{th} to 10^{th} week of gestation, six major furrows appear on the lateral wall of nose. These furrows are separated by ridges which have an ascending portion called ramus ascendens and a posteroinferior portion called ramus descendens. The inferior turbinate is also called the maxilloturbinal and is an individual bone. The first ethmoturbinal regress & the descending portion gives rise to the uncinate process , the ascending process forms the agger nasi. The first furrow gives rise to the infundibulum & the frontal recess.[9,10]

Middle turbinate is formed from the second ethmoturbinal , superior from the third. The fourth & fifth ethmoturbinals regress during development.

THE SPHENOID SINUS :

The sphenoid sinus is recognizable at around the third intrauterine month as an evagination from the sphenoethmoidal recess and again a small cavity is found at birth At the third year of life, pneumatisation of the sphenoid bone progresses and at age seven has frequently reached the floor of the sella.[9,10]

THE FRONTAL SINUS :

The frontal sinus is the most variable in size and shape and may be regarded embryologically as an anterior ethmoidal cell. From the most anterior and superior segment of the anterior ethmoid complex, the frontal bone is gradually pneumatized, resulting in frontal sinuses of variable size. At birth, the frontal sinuses are small and, on x-rays, cannot usually be differentiated from other anterior ethmoidal cells.[9,10]

Figure 5: showing lateral nasal wall in new born

ANATOMY OF PARANASAL SINUSES

The paranasal sinuses arranged in pairs, include two groups: anterior and posterior. The former include maxillary sinus, the frontal sinus and anterior ethmoidal sinus. The posterior group comprises of posterior ethmoidal and sphenoidal sinus.

MAXILLARY SINUS :

It is present since birth, but attains its maximum size around 15 to 17 years of age. The roof is formed by the floor of orbit, floor by roots of canine. Posteriorly, it is related to the infratemporal and pterygopalatine fossae, anterolateral walls are superficial and deep to soft tissues of face, medial wall formed by nasal cavity. The maxillary osteum, present at the upper part of the sinus, drains into the middle meatus. An accessory osteum is present in some people, posterior to the main osteum.[9, 10]

FRONTAL SINUS :

It is rudimentary at birth, being represented by a small upward prolongation from anterior end of the middle meatus, the nasofrontal duct. It is bound anteriorly & posteriorly by the outer & inner table of frontal bone, floor by roof of orbital cavity, medially by the septum between the two frontal sinuses. The osteum of frontal sinus is situated in its floor, drains into the middle meatus.[65]

ETHMOIDAL SINUS :

It is present at birth and in the adult life and they vary in number, size and shape. They are classified into anterior and posterior, depending on whether they communicate with middle or superior meatus. They are bound medially by upper half of nasal cavity, laterally by orbit, anteriorly by frontal process of maxilla, and posteriorly by sphenoid bone.[10]

SPHENOID SINUS :

It is present at birth. The lateral wall is related to internal carotid artery, optic nerve and the cavernous sinus, roof related to frontal lobe, olfactory tract, optic chiasma and pituitary gland, floor to pterygoid canal, medial wall is between the two sphenoid sinus. The sphenoid osteum is situated high up in the cavity of the sinus.[9,10]

PHYSIOLOGY OF SINUSES

- Air conditioning: They serve as supplementary chambers for conditioning the inspired air by heating and moistening. [9,11]
- Vocal response: They act as resonating chambers and add to quality of voice.
- Thermal insulators: They protect the structures in orbit and cranial fossae from the intratemporal variations.
- Balance of head: It reduces weight of the bones of the face, thereby aiding in the balance of head.[9,11]

MUCOCILIARY CLEARANCE

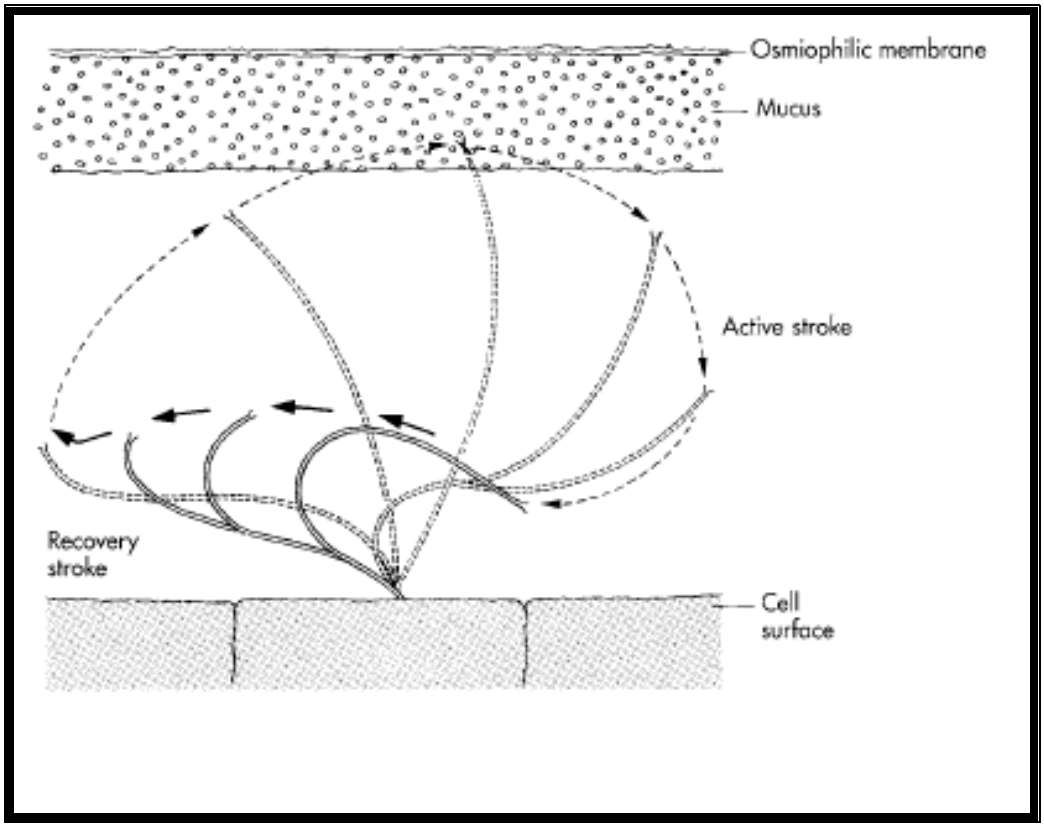
Drainage and ventilation are two most important factors in the maintenance of normal physiology of paranasal sinuses. It depends upon the amount of mucus produced, composition of mucus, effectiveness of ciliary beat, mucosal resorption, condition of ostia and ethmoidal clefts.[11]

The mucus film has two layers: an inner serous layer, called the sol phase, in which cilia beat and an outer more viscous layer, the gel phase, which is transported by the ciliary beat. This functions like a conveyor belt. Normal nasal mucus exists at a pH range of 7.5 to 7.6.[11]

In maxillary sinus, secretion transport starts from the floor of sinus in a stellate pattern. The mucus from anterior, medial, posterior, lateral wall and roof of sinus converge at the natural osteum. This is finally drained into middle meatus. Frontal sinus has active inward transportation of mucus. Due to whorled pattern of cilia, mucus is circulated again and again. Finally mucus from frontal sinus drains into frontal recess. The anterior ethmoidal cells drain into middle meatus and posterior ethmoidal cells into sphenoethmoidal cells. In the sphenoidal cells, mucus undergoes

a spiral transport and drains into sphenoethmoidal cells. All these secretions finally drain into lateral nasal wall and from there to nasopharynx.[11]

Figure 6: showing normal ciliary cycle



ANATOMIC PATHWAYS OF HEADACHE

CENTRAL PATHWAY:

The trigeminal nerve supplies most of the face & mucus membrane of oral cavity via its three divisions namely, ophthalmic, maxillary & mandibular branches. The skin of the face has three receptors, mechanoreceptors, thermoreceptors & nociceptors.[13]

The afferent fibres from the three divisions of the trigeminal nerve synapse in the trigeminal ganglion located in Meckel's cave. Trigeminal nerve has three nuclei. The Mesencephalic nucleus, situated in the midbrain, receives the proprioception from the jaw muscles. The Main sensory nucleus is situated in the pons & receives sensation from the face. The descending spinal tract & Spinal nucleus, receives the fibres carrying pain & temperature. The spinal nucleus has three parts, the Oral nucleus carrying sensation from mucus membrane of the oral cavity, Interpolar nucleus, carrying dental pain & Caudal nucleus carrying pain from the face.[13]

Efferent fibres from the Spinal nucleus & Main sensory nucleus relay to the contralateral brain stem, medial leminiscus, ventral posterior nucleus of thalamus, and finally to the primary somatosensory cortex. The Caudal nucleus relays on the reticular formation of the brainstem.[13]

PERIPHERAL PATHWAYS:

Pain from the cerebral blood vessels: The Internal & External carotid arteries are supplied by sympathetic & parasympathetic systems. The sympathetic supply is by the superior cervical ganglion via C8, T1, 2 & 3 spinal nerves. The Greater superficial petrosal nerve branch of facial nerve forms the parasympathetic supply.

Pain from the sinus, eye and teeth: The mucus membrane of the paranasal sinus, periosteum of the skull are pain sensitive and supplied by the corresponding division of the trigeminal nerve.[13]

RELATION OF HEADACHE AND PARANASAL SINUS

Pain due to sinus aetiology is characterised by occurrence of the pain during awakening, intensification by changes in posture and relief with antibiotics.[14]

For the maxillary sinus, pain is carried via maxillary division of the trigeminal nerve. The ophthalmic & maxillary division carries pain from the ethmoids. Nasociliary & sphenopalatine nerves supply the sphenoid sinus.[14]

In acute frontal sinusitis, patient complains of severe pain over the frontal sinus. In chronic sinusitis, patients have headache with radiology showing scalloping of the frontal sinus.[14,17]

Patients with acute maxillary sinusitis presents with pain & tenderness over the affected sinus along with pain in the ipsilateral teeth, deep eye pain, photophobia, and mucopurulent rhinorrhea. Chronic sinusitis will be normally pain free.[14,17]

Acute ethmoiditis presents with frontal & orbital headache, & chronic presenting with nasal polyp.[14]

Acute sphenoiditis presents with severe headache & pain deep to the eyes.[14,17]

INTERNATIONAL HEADACHE SOCIETY CLASSIFICATION

PRIMARY HEADACHE: [15,16]

1. Migraine
    a. Migraine with aura
    b. Migraine without aura
    c. Childhood periodic syndromes that are precursors of migraine
    d. Basilar type migraine
    e. Childhood syndromes associated with migraine

2. Tension- type headache
3. Cluster headache and other cephalgias
    a. Cluster headache:
        i. episodic cluster headache
        ii. chronic cluster headache
        iii. paroxysmal hemicranias
        iv. short lasting unilateral neuralgiform headache with conjunctival injection and tearing
        v. hemicranial continua
4. Other primary headache
    a. Chronic daily headache
    b. Primary stabbing headache
    c. Hypnic headache
    d. Primary cough headache

SECONDARY HEADACHE:[15,16]

1. Caused by head or neck trauma
    a. Traumatic intracranial hematoma
    b. Chronic post traumatic headache
2. Cranial or cervical vascular disorders
    a. Ischemic stroke and Transient Ischemic attacks
    b. Non traumatic intracranial hemorrhage
    c. Unruptured vascular malformations
    d. Arteritis
    e. Carotid or vertebral pain
    f. Cerebral venous thrombosis
3. Non vascular, non infectious intracranial disorders
    a. High CSF pressure (due to various causes including neoplasms)
    b. Idiopathic intracranial hypertension secondary to hydrocephalus
    c. Low CSF pressure
    d. CSF leak
    e. Non infectious inflammatory diseases
        1. Neurosarcoidosis
    f. Aseptic(non infectious) meningitis
    g. Intracranial neoplasm
4. Attributed to use or withdrawal of substances
    a. Headache caused by substance use or exposure
        i. Cannabis
        ii. Cocaine

iii. Nitric oxide donor

iv. Histamine

v. Alcohol

vi. Food component and additives

b. Headache

i. From medication overuse

ii. From substance withdrawal

5. Infectious causes

a. Intracranial infections

i. Bacterial meningitis

ii. Encephalitis

iii. Brain abscess

iv. Subdural empyema

b. Systemic infections

6. Disturbances of homeostasis

a. Attributed to hypoxia or hypercapnia

b. High altitude headache

c. Sleep apnea

d. Arterial hypertension

e. Endocrine dysfunction

7. Headache or facial pain attributed to disorder of structures in head and neck

a. Cranial bone

i. Osteomyelitis

b. Neck

i. Cervicogenic headache

ii. Retropharyngeal tendonitis

iii. Craniocervical dystonia

c. Eyes

i. Acute glaucoma

ii. Refractory errors

iii. Ocular inflammatory disorders

d. Ears

i. Primary otalgia

ii. Referred otalgia

e. Nose and sinuses

i. Acute rhinosinusitis

ii. Teeth, jaws and related structures

iii. Temporomandibular joint disease

8. Headache attributed to psychiatric disorder

a. Attributed to somatisation disorder

b. Attributed to psychotic disorder

9. Cranial neuralgias

a. Trigeminal neuralgia

b. Glossopharyngeal neuralgia

c. Nervus intermedius neuralgia

d. Nasociliary neuralgia

e. Supraorbital neuralgia

f. Occipital neuralgia

g. Neck-Tongue syndrome

h. Herpes zoster

10. Miscellaneous

a. Sinus barotraumas

b. Vacuum headache

RELEVANCE OF NASAL ENDOSCOPY AND FRONTAL HEADACHE

Frontal area is common to headache and facial pain. Inflammation and engorgement of the turbinates, ostia, and nasal frontal duct are responsible for most of the pain arising from paranasal sinuses. Any anatomical abnormality, can lead to contact points between opposing mucosal surfaces which lead to headache. In case of facial pain without any objective disease on DNE & Computed Tomography Paranasal sinuses should be treated as non nasal cause for headache. Frontal headache is the most common site of pain according to a study conducted in 2003.[17]

Chronic infective rhinosinusitis is defined as inflammation of nose and paranasal sinuses for 12 weeks or more and characterised by 2 or more of the following symptoms like: nasal block or congestion, nasal discharge, reduction or loss of smell, facial pressure or pain with either endoscopic or CT showing signs of disease. Mucosal abnormality is seen in 30 % of asymptomatic adult in CT. Hence, only a positive CT findings with a normal DNE does not warranty surgery.[23]

Refractory headache without typical sinus symptoms with abnormality on endoscopy points to sinusitis.[2]

Endoscopy has a strong correlation with CT. The symptoms, endoscopy & CT are complimentary in evaluation of a patient with headache.[24]

According to a recent study, 95% of patients diagnosed as sinusitis without any nasal endoscopy, had either migraine or tension type headache.[4]

The nasal mucosa is under autonomic control. Any sinus pathology due to anatomic abnormality may be worsened by increased parasympathetic outflow or reduced sympathetic tone. Thus, patients with sinusitis may present with atypical migraine or vascular instability headaches. Hence, nasal endoscopic evaluation is a

MUST in patients with frontal headache. It is a non invasive examination in patients with headache, by which patients may be selected for CT evaluation.[25]

ROLE OF ANATOMICAL VARIATIONS IN SINONASAL DISEASE LEADING TO HEADACHE

Patency of the pathways through which the sinuses drain is crucial for adequate mucociliary function and subsequent sinus drainage. Nasal and sinus mucosa produces approximately 1 L of mucus per day which is cleared by mucociliary transport. Osteal obstruction may lead to fluid accumulation and stagnation, creating a moist, hypoxemic environment ideal for growth of pathogens.[43]

Any anatomic variations of nose and paranasal sinus is a predisposing factor for chronic rhinosinusitis.[19, 56, 61]

Major anatomic variants leading to osteomeatal obstruction are deviated nasal septum, concha bullosa, paradoxical middle turbinate and infra orbital (Haller) cell.

A middle turbinate contacting nasal septum or lateral nasal wall, inferior turbinate contacting septum, ethmoidal bulla touching middle turbinate, septal spur touching lateral wall or superior turbinate [18]can cause headache.[20]

DEVIATED NASAL SEPTUM :

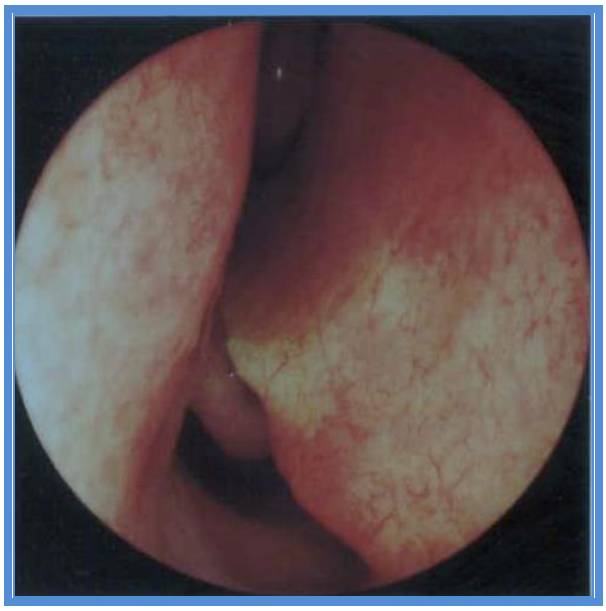
Deviated nasal septum at the level of middle turbinate is one of the main causes of anatomical obstruction at osteomeatal complex. [23,27,41,55]

Cottle classified septal deviation in to 3 types

1. Simple deviation: only mild deviation with no obstruction and it is the most common type seen.
2. Obstruction: here the deviated septum touches the lateral wall, but on decongestion with vasoconstrictors the turbinate shrinks and the obstruction is relieved.
3. Impaction: massive angulation of the septum with a spur

DNS with spur causes pain by ant ethmoidal nerve syndrome ie sluders neuralgia.[43]

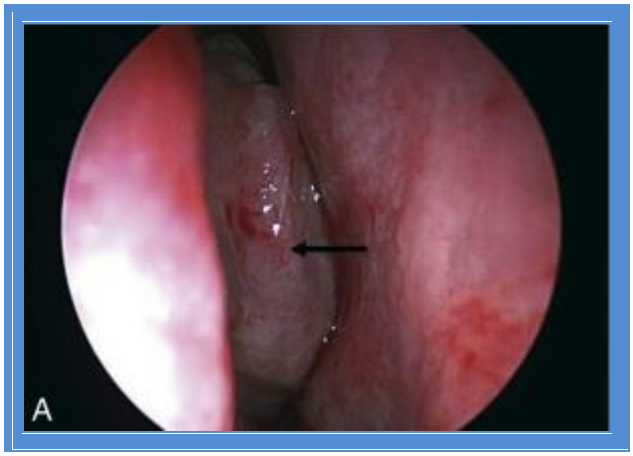
Figure 7: showing Deviated Nasal Septum with spur



CONCHA BULLOSA :

Concha bullosa is pneumatisation of the concha, usually the middle turbinate and is one of the most common anatomic variations in nose. Bolger et al classified pneumatisation of the concha based on the location as lamellar concha bullosa, bulbous concha bullosa, and extensive concha bullosa. There are many studies in the literature suggesting the role of concha bullosa in sinus disease etiology. If the concha is expanded significantly, it leads to deviation or compression of the uncinate process to the lateral wall of nose leading to obstruction of the ethmoid infundibulum.[21, 22, 40]

Figure 8: showing concha bullosa



PARADOXICAL MIDDLE TURBINATE :

Paradoxical turbinate of the nasal cavity leads to air way obstruction and chronic sinusitis. A middle turbinate that is concave medially rather than laterally is called paradoxical. Usually paradoxical turbinates occur where the maxillary sinus is hyperplastic. The overgrowth causes the mucosa to buckle and fold inwards, with the resultant curve pointing towards the septum. An exaggeratedly curved paradoxical turbinate compresses the uncinate process leading to meatal obstruction.[34,57]

Figure 9: showing paradoxical middle turbinate

MATERIALS AND METHODS

SOURCE OF DATA

This study included patients presenting with history of frontal headache attending the ENT OPD at R. L. Jalappa Hospital, Kolar between Jan 2011 to Jul 2012.

INCLUSION CRITERIA

All the patients in the age group of above 18 yrs suffering from frontal headache

EXCLUSION CRITERIA

Patients who had:

a. Serious illness
b. History of previous head injury
c. CSF rhinorrhea
d. Benign and malignant tumours of brain/head and neck

Patients who satisfy the criteria of selection mentioned above were taken as subjects of the study. A total of 100 patients were taken for the study. The complete data regarding the patients were noted in a case proforma as per the annexure.

All the patients satisfying the criteria of selection were subjected to a detailed history regarding headache and its associated symptoms like:

1. Nasal obstruction
2. Rhinorrhea
3. Postnasal drip
4. Change in smell
5. History of sneezing

Any other symptoms noticed by the patient as below were also documented as follows:

1. Decreased vision
2. Photophobia
3. Aura associated with the headache
4. Physical and mental stress
5. Neck pain/stiffness

Following thorough history taking as mentioned above, patients were subjected to a detailed examination of the nose and paranasal sinuses. Anterior and posterior rhinoscopy was done and any abnormality recorded. The ears & throat were also examined for any associated clinical abnormality like tonsillar enlargement, retracted tympanic membrane etc.

All the patients were then subjected to a nasal endoscopic examination.

Preparation of the patient:

Good vasoconstriction and surface anaesthesia are a prerequisite to a complete and successful Diagnostic Nasal Endoscopy (DNE). In our study, a mixture of 27 ml of 4% lignocaine and 3 ampoules of 1:1000 adrenaline was used. The resulting concentration was 4% lignocaine and 1:10000 adrenaline. The ribbon gauze strips were soaked in the above solution and then squeezed well before being introduced into the nasal cavity. The ribbon gauze strips were applied to any area which was likely to come into contact with the nasal endoscope during the procedure. This included the nasal septum, the base and the free edge of the middle turbinate, the middle meatus, area of the sphenopalatine ganglion & at the attachment of the middle turbinate, to anesthetize the anterior ethmoidal nerve.

Procedure was explained to the patient and informed consent was obtained. Nasal packing was done under supine position, with the help of a Tilley's nasal dressing forceps & Thudicum's speculum.

Instrumentation:

All diagnostic nasal endoscopies were performed with a Karl Storz 0 degree endoscope of 18mm length and external diameter of 4 mm. This endoscope had enough direct forward vision to permit introduction in the direction of the main axis and thus avoid injury to the mucus membranes. It also had a good viewing angle, enabling visualization of the middle meatus and also had a panoramic view of the nasopharynx. To prevent fogging, the tip of the endoscope was dipped in a solution of a savlon

Other instruments used were:

- Freer elevator
- Suction tips
- Ball point probe

Position of the endoscopist and the patient:

The endoscopist stood on the patient's right side with the patient in the supine position and head facing the examiner. The endoscope was held between the thumb and the forefinger of the left hand, which rested lightly on the cheek and the bridge of the nose of the patient with the right hand free to hold the suction tip or any other instruments.

The Diagnostic Nasal Endoscopy was performed in three passes:

In the first pass, the endoscope was passed along the floor of the nose inspecting the inferior turbinate, nasal septum and the middle turbinate. Once the choana was reached, the eustachian tube orifice, fossa of Rosenmuller and the

nasopharynx were visualized. The scope was rotated to visualize the entire nasopharynx and the opening of the opposite eustachian tube. As the scope is withdrawn the inferior meatus was examined. In some cases, the nasolacrimal duct opening could be visualized as either a small punctum or a slit like opening (Hasner's valve) just below the junction of the anterior and middle thirds of the inferior turbinate.

In the second pass, the scope was passed posteriorly between the middle turbinate and the septum into the sphenoethmoidal recess. High up on the anterior wall of the sphenoid sinus at the level of the superior turbinate or slightly inferior, the sphenoid ostium could be visualized.

The third pass was made along the middle meatus. The insertion of uncinate process was identified by a shallow groove when the scope was introduced into the middle meatus. Still more posteriorly, the posterior fontanelle and accessory maxillary ostium could be visualised.

Any anatomical variations or pathological findings were recorded separately on the right and the left nasal cavities.

These patients were followed up by X- ray of the paranasal sinuses (Waters view). CT paranasal sinuses were taken in some patients with abnormal X- ray or abnormal nasal endoscopic findings.

Finally, a provisional diagnosis was reached depending on the history, examination, DNE with, X ray paranasal sinuses with or without CT paranasal sinuses.

In patients diagnosed as sinusitis, the DNE & CT PNS findings were reviewed to calculate the Lund & Kennedy and Lund & Mackay score respectively & compared.

Lund and Kennedy Endoscopic score was calculated separately on the right and left as follows.

Polyps were scored from 0-3 with 0 indicating absence of polyps, 1 as polyps in the middle meatus only, 2 as polyps beyond middle meatus but not completely obstructing the nose and 3 as polyps completely obstructing the nose.

Edema was scored from 0-2 with 0 indicating no edema, 1 as mild edema and 2 as severe edema.

Discharge was scored from 0-2 with 0 indicating no discharge, 1 as thin pus and 2 as thick pus

The CT scan findings were also scored as per the Lund & Mackay scoring system separately for left and right side. Maxillary, anterior ethmoids, posterior ethmoids, frontal, sphenoid sinuses were scored from 0-2, where 0 was no opacification of sinus cavity, 1 being partial opacification and 2 was complete opacification. Osteomeatal complex was scored as 0 or 2; 0 if it was not blocked and 2 if it was.

All the patients were put on medical management initially. In patients not responding to conservative management, appropriate surgery was undertaken.

Figure 10: showing position of the endoscopist during DNE

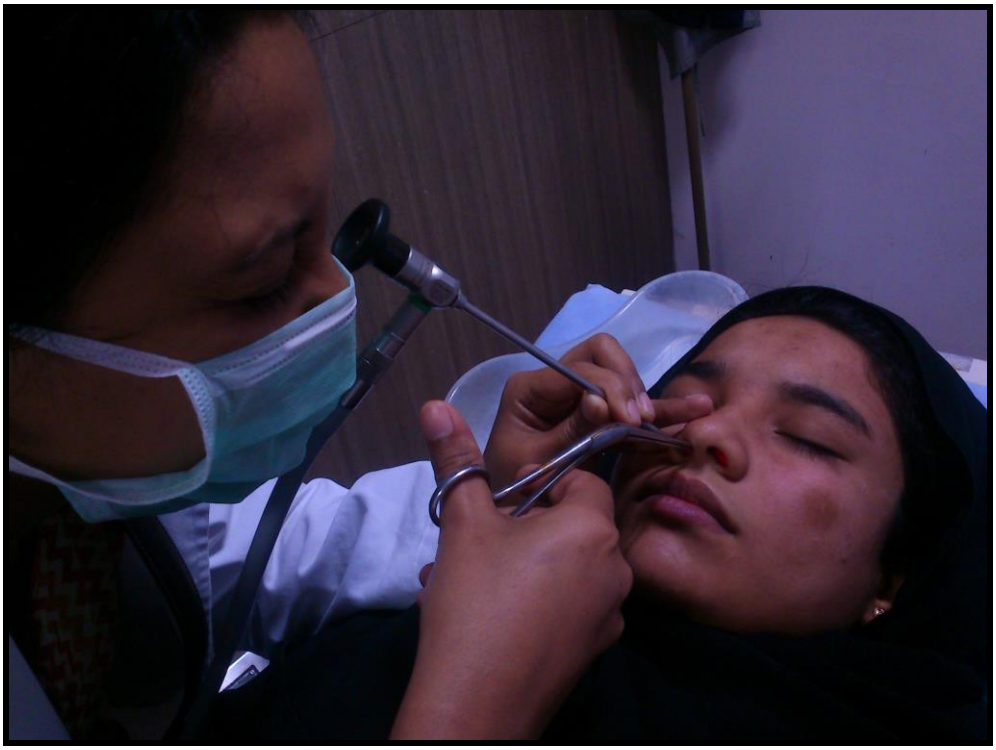


Figure 11: showing instruments used for DNE

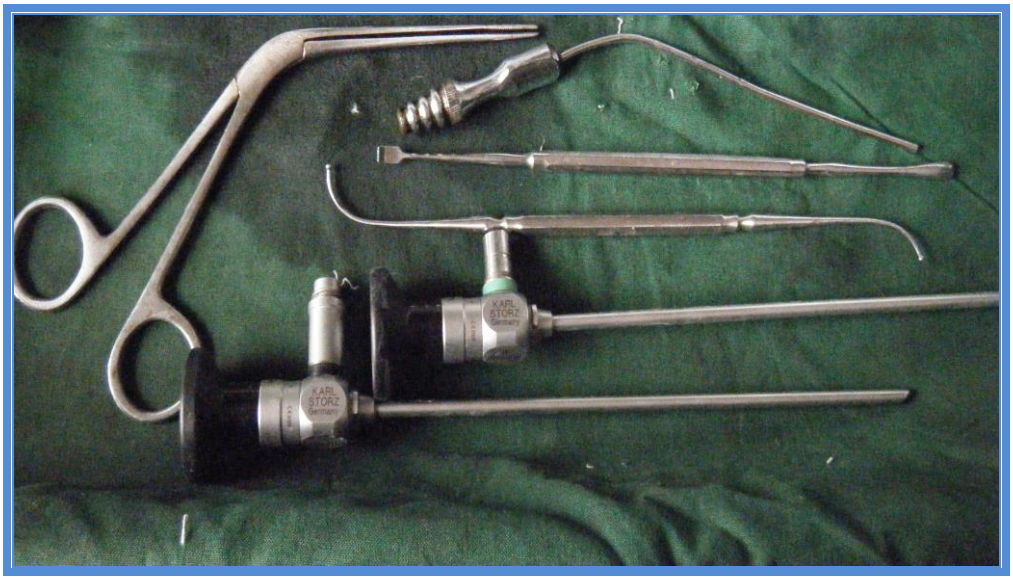


Figure 12: showing DNS with spur on DNE

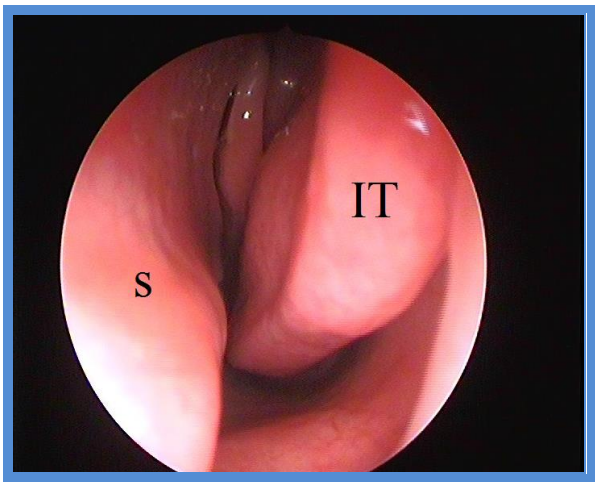


Figure 13: showing enlarged ethmoidal bulla on DNE

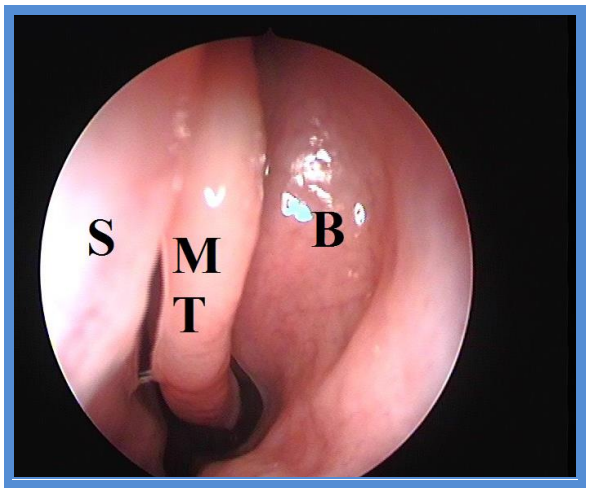


Figure 14: showing Right Antrochoanal polyp on DNE

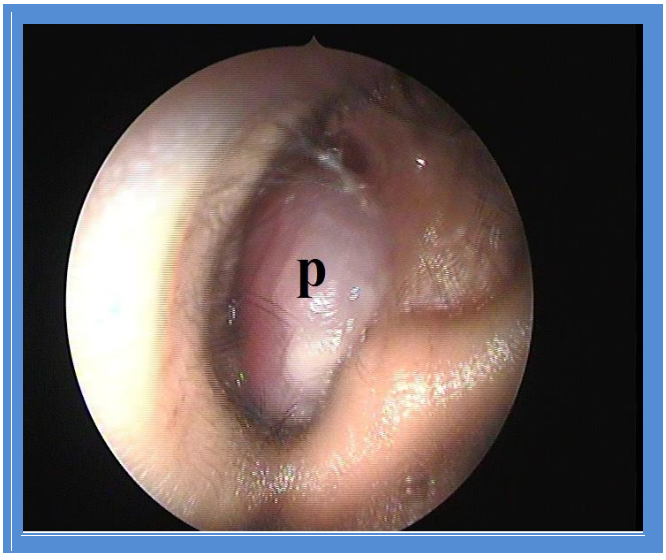


Figure 15: showing involvement of bilateral maxillary and ethmoidal sinuses on CT SCAN, coronal view

Figure 16: showing Right Antrochoanal polyp on CT scan PNS –axial view

Figure 17: showing involvement of bilateral frontal sinus on CT PNS-coronal view

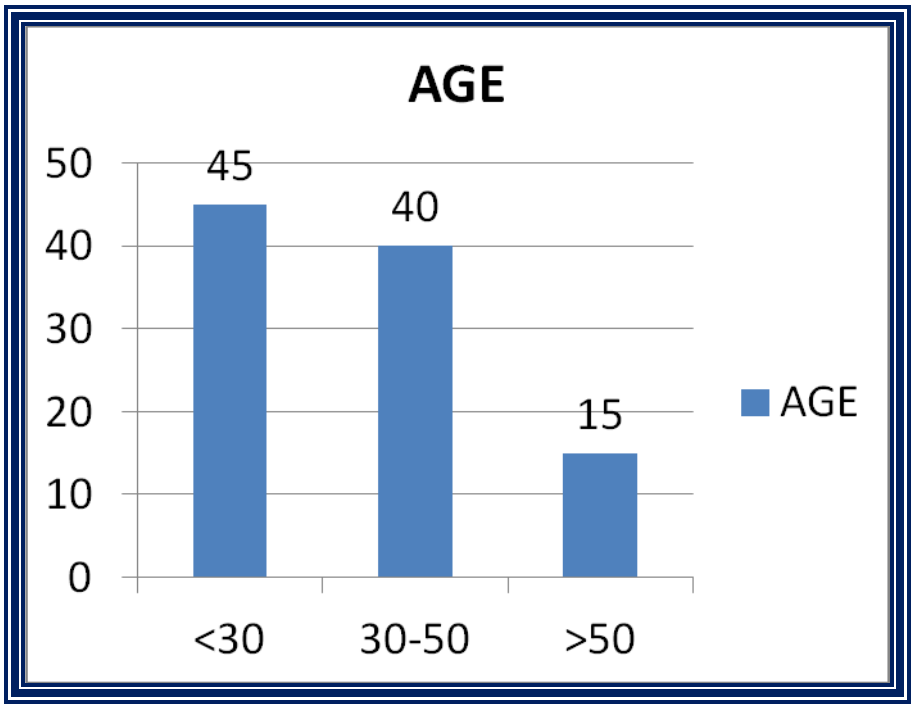
Figure 18: showing bilateral ethmoidal polypi in CT axial view

OBSERVATIONS & RESULTS

Table 1: showing age distribution in patients with frontal headache

Age in yrs	Number of patients
<30	45
30 to 50	40
>50	15

Graph 1: Age distribution in patients with frontal headache



This study, shows that majority (45%) of the patients belong to less than 30 years age group. The least was in 15 % which belonged to the age group of more than 50 years.

Table 1a: Showing maximum and minimum age of patients with frontal headache

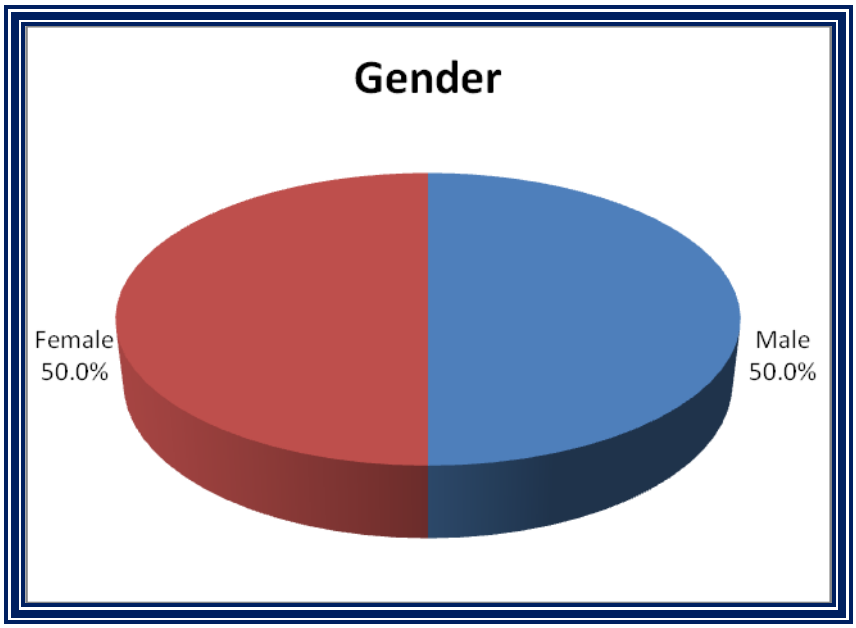
	Number of patients	Minimum	Maximum	Mean	SD
Age	100	18	69	34.77	13.883

This shows that mean age of patients with frontal headache was 34 years

Table 2: showing the Gender distribution in patients with frontal headache

Gender	Frequency	Percent
Male	50	50.0
Female	50	50.0
Total	100	100.0

Graph 2: showing the Gender distribution in patients with frontal headache

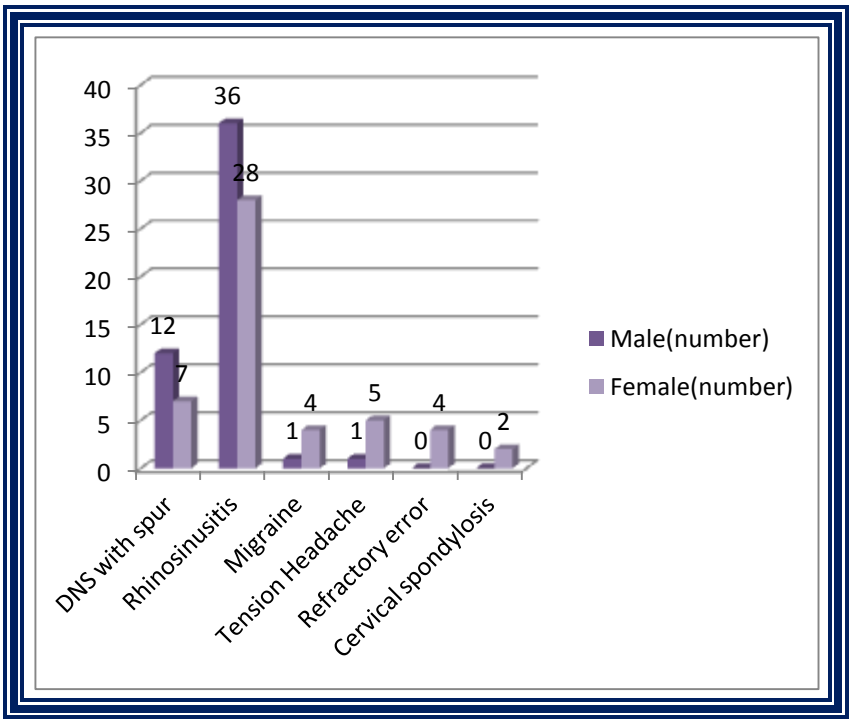


The male to female ratio was 1:1(male -50, female- 50)

Table 2a: showing the gender distribution in patients with a provisional diagnosis

Diagnosis	**Male**	**Female**
DNS with spur	12	7
Rhinosinusitis	36	28
Migraine	1	4
Tension headache	1	5
Refractory Errors	0	4
Cervical spondylitis	0	2

Graph 2a: showing the gender distribution in patients with a provisional diagnosis

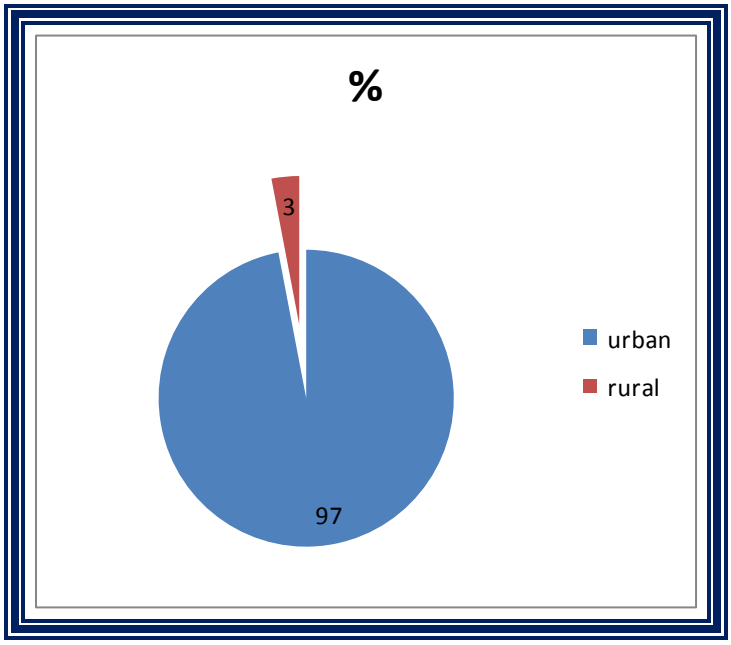


In the present study, DNS with spur impinging on the inferior turbinate and acute exacerbation of Chronic Rhinosinusitis were predominant in both male and female population with a comparatively greater frequency in males, whereas tension headache and Migraine were more frequently seen in females.

Table 3: showing the Geographical distribution in patients with frontal headache

Place	Frequency	Percent
Urban	97	97.0
Rural	3	3.0
Total	100	100.0

Graph 3 : showing the Geographical distribution in patients with frontal headache



In this study, the majority, i.e 97% patients were from urban background and the rest, rural.

Table 4: showing the Duration of headache in patients with frontal headache

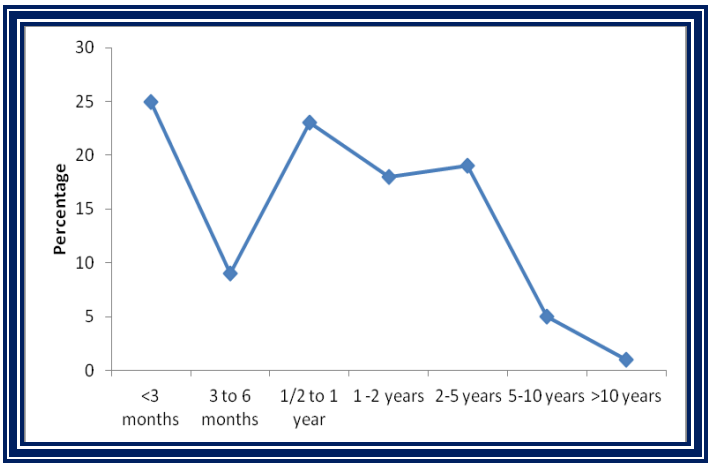
Duration	Frequency	Percent
<3 months	25	25.0
3 months to 6 months	9	9.0
6 months to 1 year	23	23.0
1 -2 years	18	18.0
2-5 years	19	19.0
5-10 years	5	5.0
>10 years	1	1.0
Total	100	100.0

Table 4a1: showing maximum and minimum duration of frontal headache

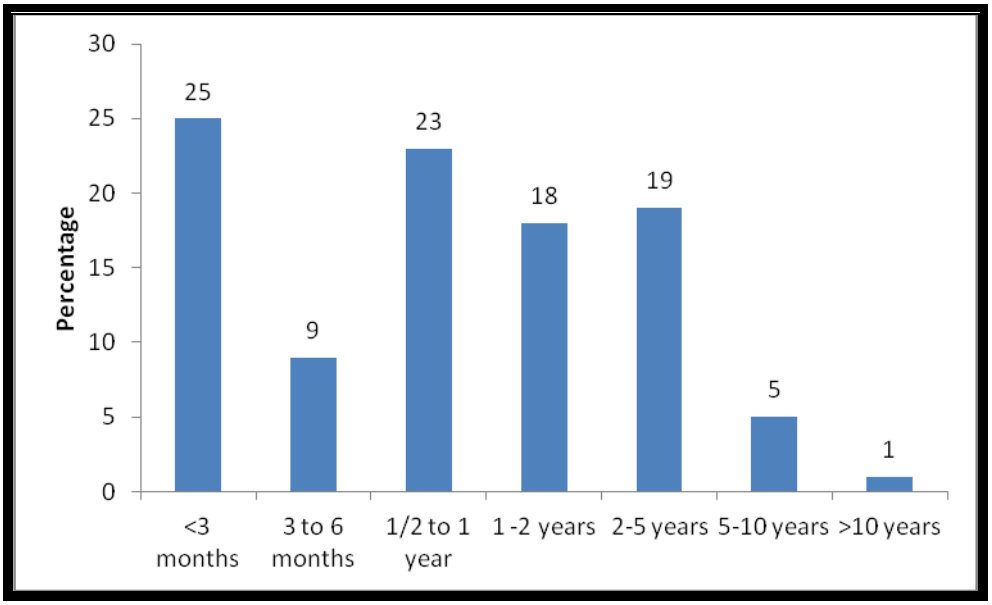
	Number of patients	**Minimum**	**Maximum**	**Mean**	**SD**
Duration in months	100	.25	240.0	24.10	33.4

This shows that mean duration of frontal headache among the patients were 2 years.

Graph 4a: showing duration of headache in patients with frontal headache



Graph 4b: showing duration of headache

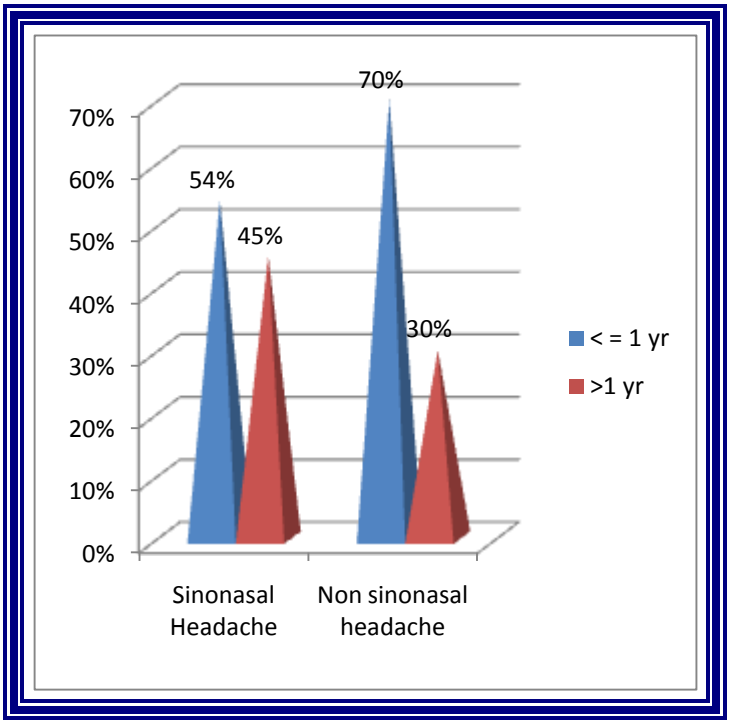


In this study, 57 % patients had headache of less than or equal to 1 year of duration.

Table 4a: showing relation of duration of headache and provisional diagnosis

Duration	Sinonasal headache in %	Non sinonasal headache in %
<=1 yr	54	70
>1 yr	45	30

Graph 4 c: showing relation of duration of headache and provisional diagnosis

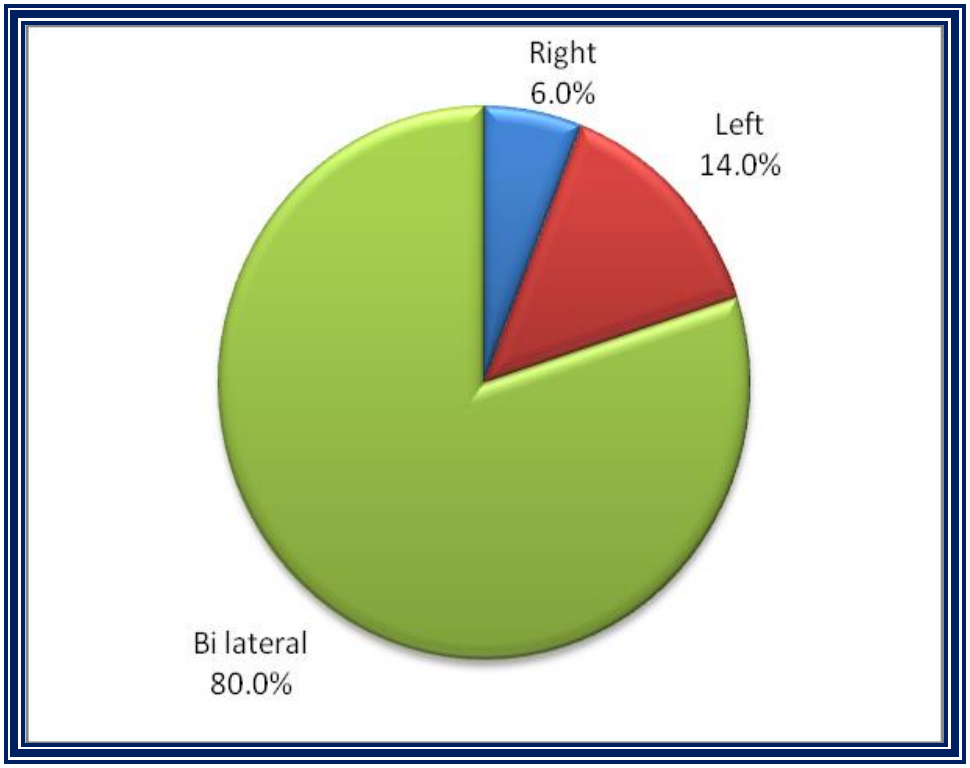


In this study, chronicity of headache was seen more in Sinonasal headache compared to non sinonasal. 45 % of patients with headache due to sinonasal cause had headache of more than 1 year compared non sinonasal headache which accounted for only 30%.

Table 5: showing laterality in frontal headache

Side	Frequency	Percent
Right	6	6.0
Left	14	14.0
Bilateral	80	80.0
	100	100.0

Graph 5: showing laterality in frontal headache

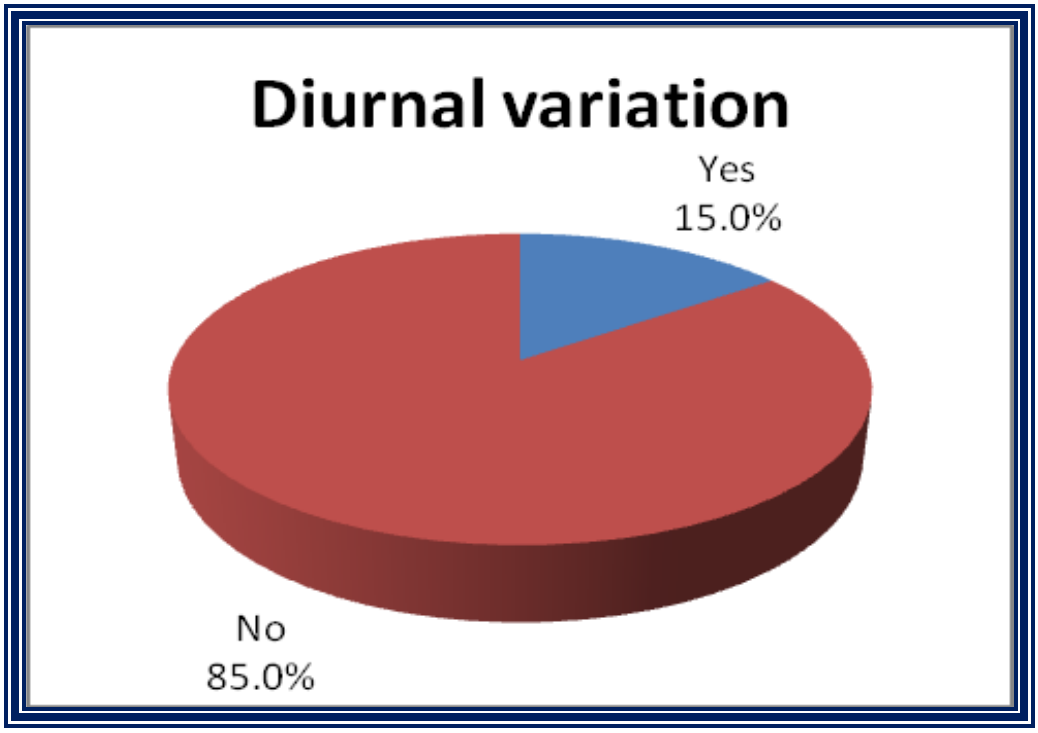


This study shows that bilateral frontal headache was seen in 80% cases and among the unilateral headache, left sided headache is more common than the right.

Table 6: showing diurnal variation of frontal headache

Diurnal variation	Frequency	Percent
Yes	15	15.0
No	85	85.0
Total	100	100.0

Graph 6: showing diurnal variation of frontal headache

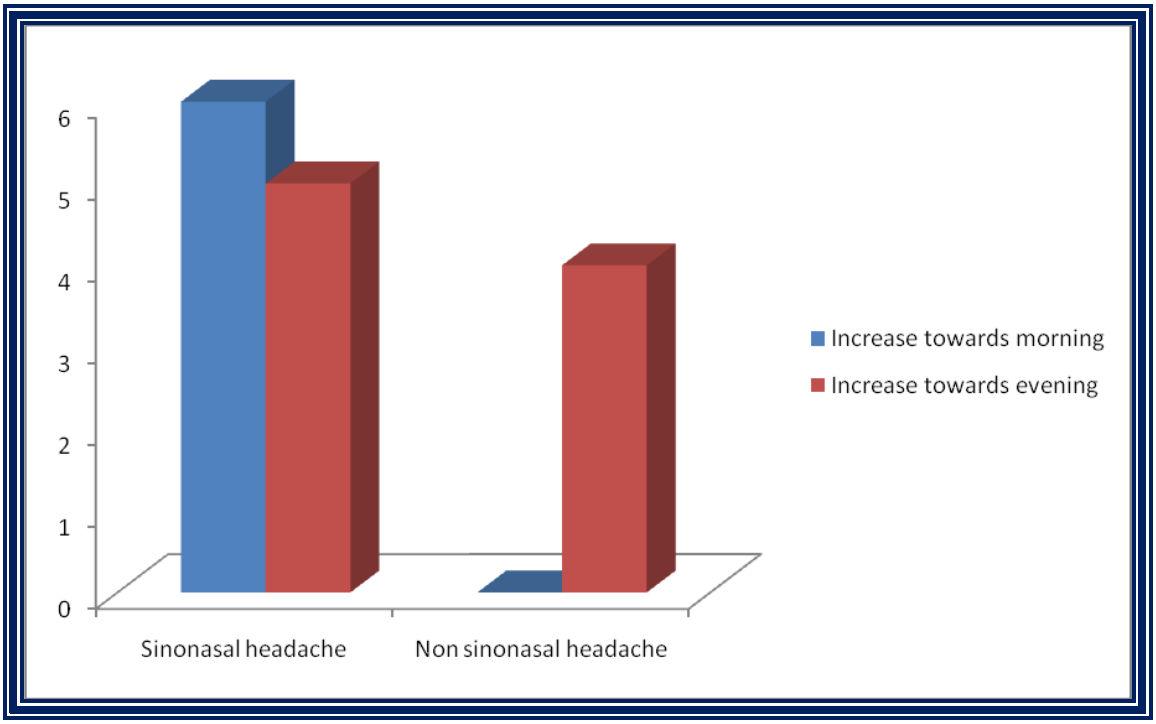


This study shows that diurnal variation of frontal headache was seen in 15 % cases.

Table 6a: Showing relationship between diurnal variation of headache and diagnosis

Diurnal Variation	**Sinonasal headache**	**Non sinonasal headache**
Increase towards morning	6	0
Increase towards evening	5	4

Graph 6a : Showing relationship between diurnal variation of headache and diagnosis

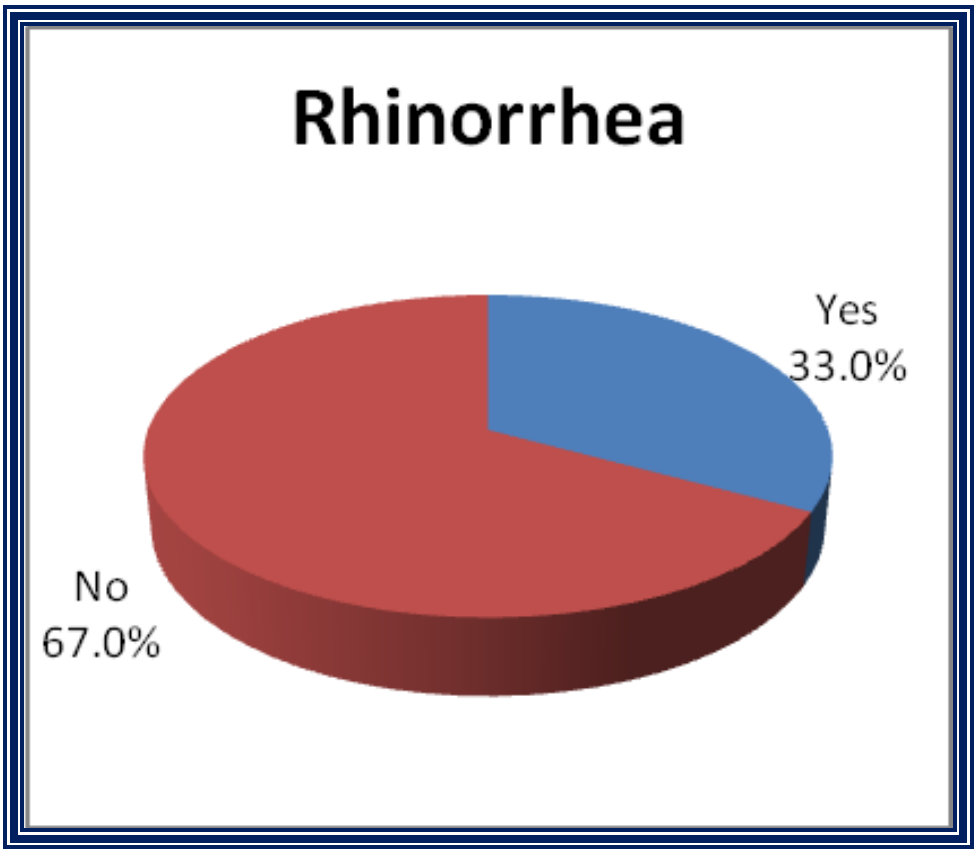


In the present study, the diurnal variation of headache was seen in more patients with sinonasal cause for the headache. Patients with tension headache and cervical spondylitis also showed an increase in the headache towards evening.

Table 7: showing history of rhinorrhea in patients with frontal headache

rhinorrhea	Frequency	Percent
Yes	33	33.0
No	67	67.0
Total	100	100.0

Graph 7 : showing history of rhinorrhea in patients with frontal headache

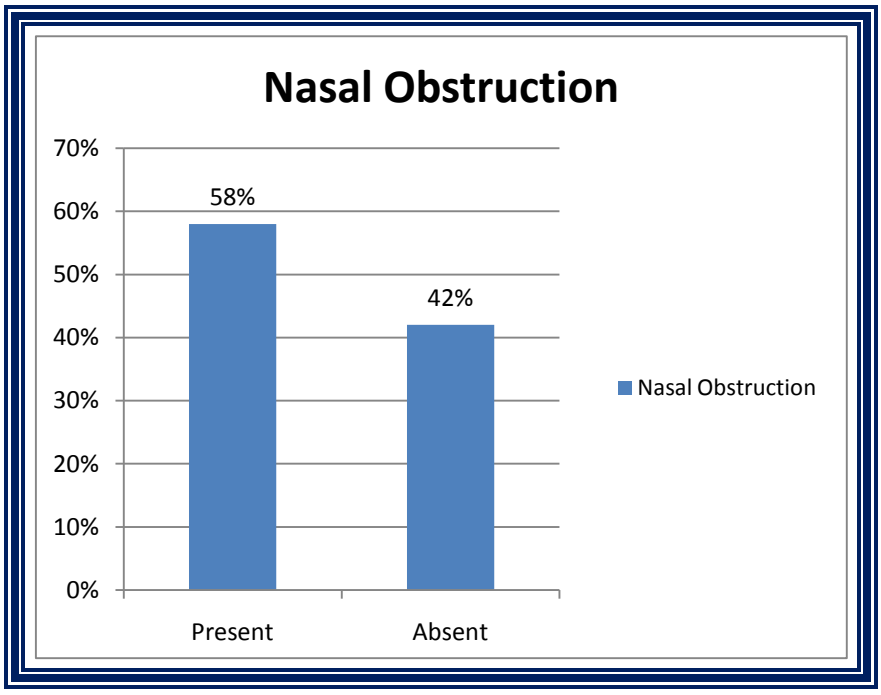


In this study, 33% cases had history of rhinorrhea along with frontal headache.

Table 8: showing history of nasal obstruction in patients with frontal headache

Nasal obstruction	Frequency	Percent
Yes	58	58.0
No	42	42.0
Total	100	100.0

Graph 8 : showing history of nasal obstruction in patients with frontal headache

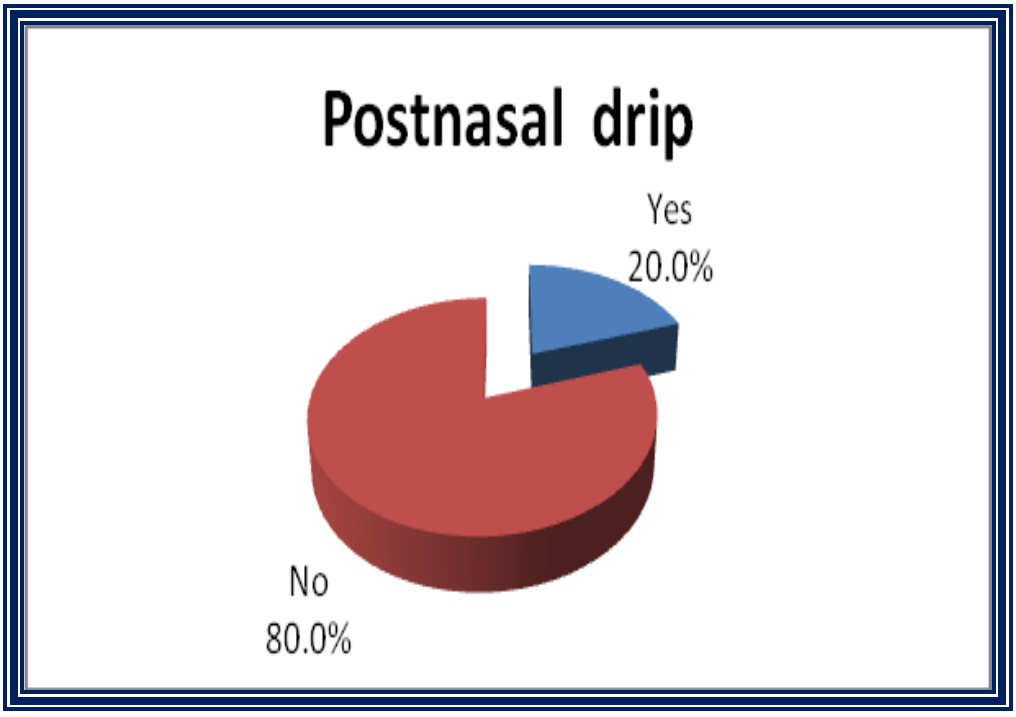


In this study, nasal obstruction was present in 58% cases with frontal headache.

Table 9: showing history of postnasal drip in frontal headache

postnasal drip	Frequency	Percent
Yes	20	20.0
No	80	80.0
Total	100	100.0

Graph 9: showing history of postnasal drip in frontal headache

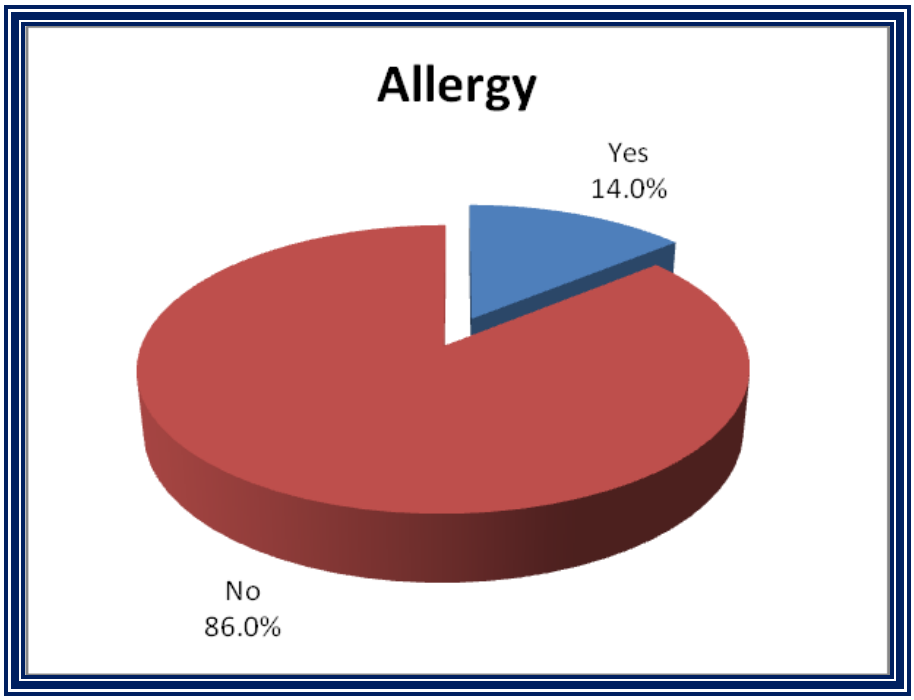


In this study, 20% cases had history of postnasal drip associated with frontal headache

Table 10: showing history of allergy in frontal headache

Allergy	Frequency	Percent
Yes	14	14.0
No	86	86.0
Total	100	100.0

Graph10: showing history of allergy in frontal headache

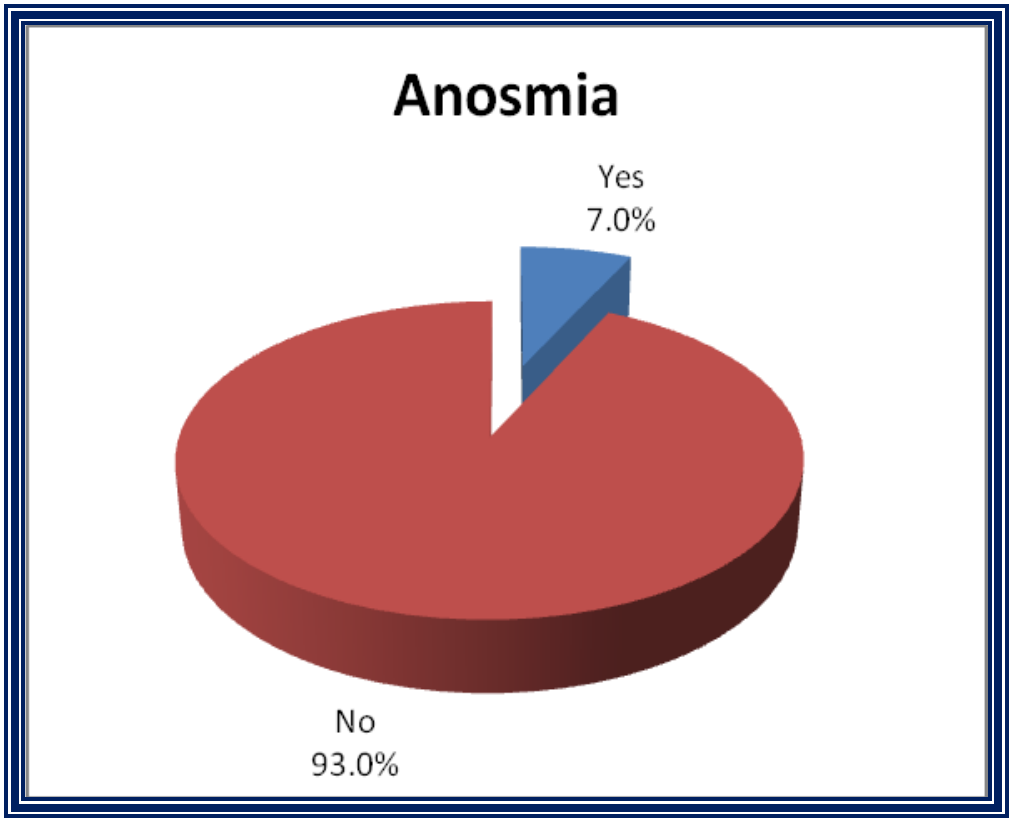


In this study, 14 % had history of allergy associated with frontal headache.

Table 11: showing history of anosmia in patients with frontal headache

Anosmia	Frequency	Percent
Yes	7	7.0
No	93	93.0
Total	100	100.0

Graph 11: showing presence of anosmia in patients with frontal headache



In this study, 7 % of patients with frontal headache had history of anosmia.

Table 11 a: showing relation of anosmia and Anterior Rhinoscopy

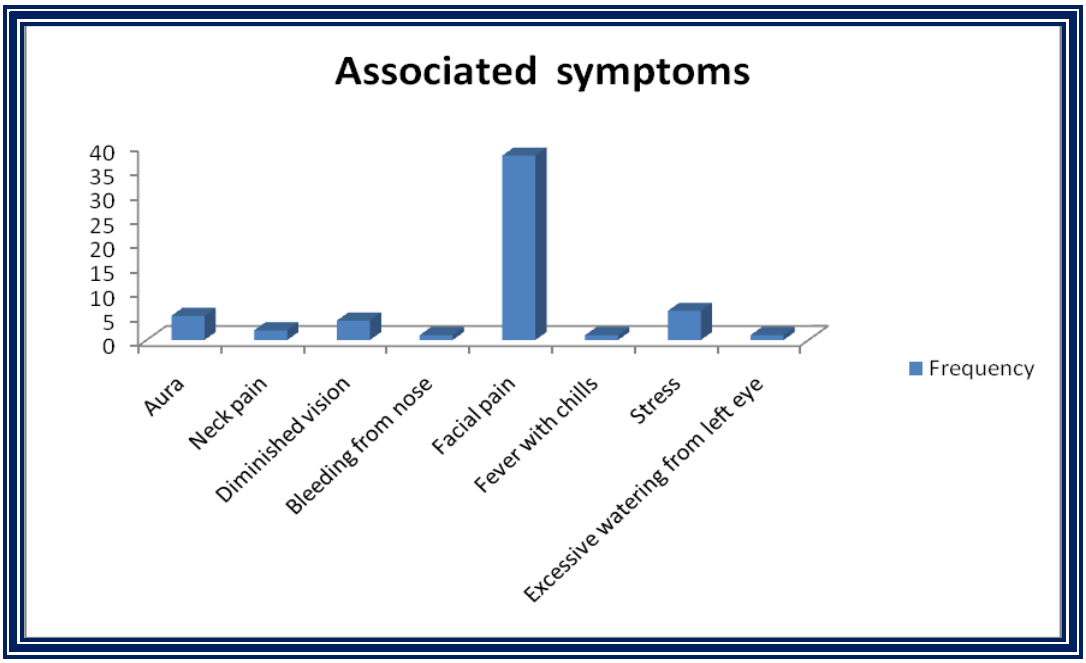
Number of patients with anosmia	Presence of polyps
7	7

In this study. all the patients with anosmia were found to have bilateral ethmoidal polypi on Anterior rhinoscopy.

Table 12: Other associated symptoms in patients with frontal headache

others	Frequency	Percent
Aura	5	5.0
Neck pain	2	2.0
Diminished vision	4	4.0
Bleeding from nose	1	1.0
Facial pain	38	38.0
Fever with chills	1	1.0
Stress	6	6.0
Excessive watering from left eye	1	1.0

Graph 12: Other associated symptoms in patients with frontal headache

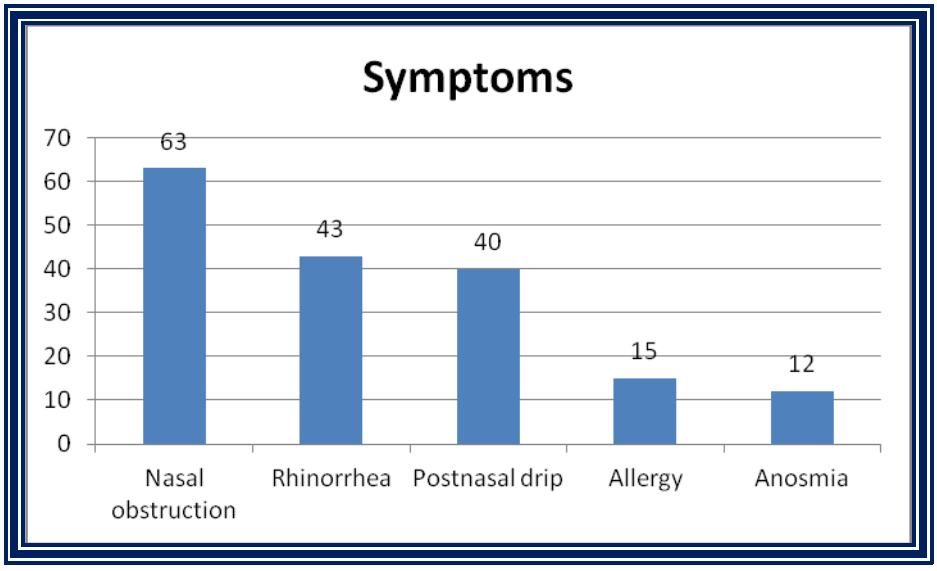


In this study, facial pain was seen in 38 % cases, and all had a provisional diagnosis of Rhinosinusitis. The other symptoms noted were, headache and fever, which was attributed to preseptal cellulitis. Excessive watering from left eye was seen in 1 case that eventually had Left dacryocystitis associated with sinusitis.

Table 13: showing relative incidence of symptoms in patients with sinusitis

Symptoms	Percentage of sinusitis
Nasal obstruction	63
Rhinorrhea	43
Postnasal drip	40
Allergic symptoms	15
Anosmia	12

Graph 13: showing relative incidence of symptoms in patients with sinusitis

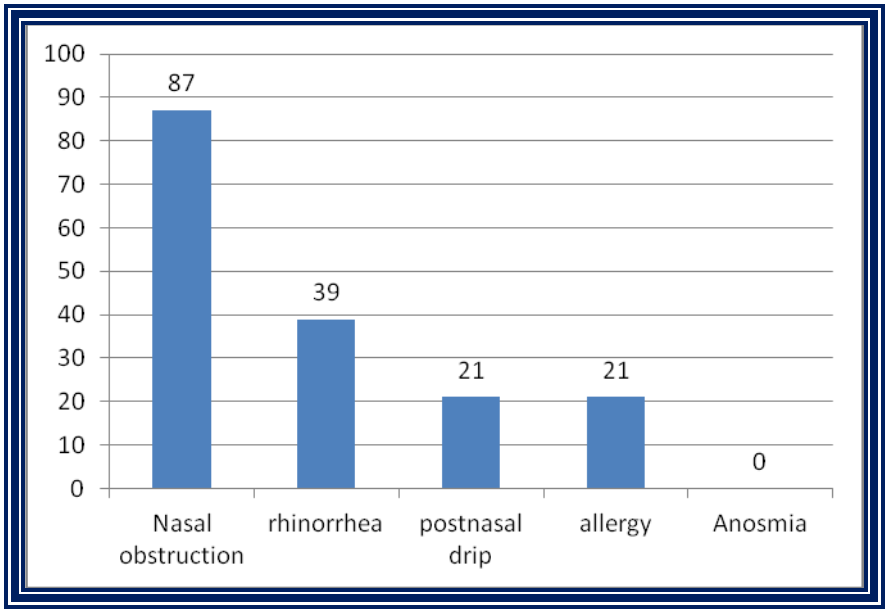


This table/graph shows that in patient with sinusitis, nasal obstruction is a predominant symptom followed by rhinorrhea, postnasal drip, history of allergy and anosmia. It was noted that patients with pansinusitis presented invariably with all the above symptoms.

Table 14: showing symptoms in patients with DNS

Symptoms	Percent
Nasal obstruction	87
Rhinorrhea	39
Postnasal drip	21
Allergic symptoms	21
Anosmia	0

Graph 14: showing symptoms in patients with DNS

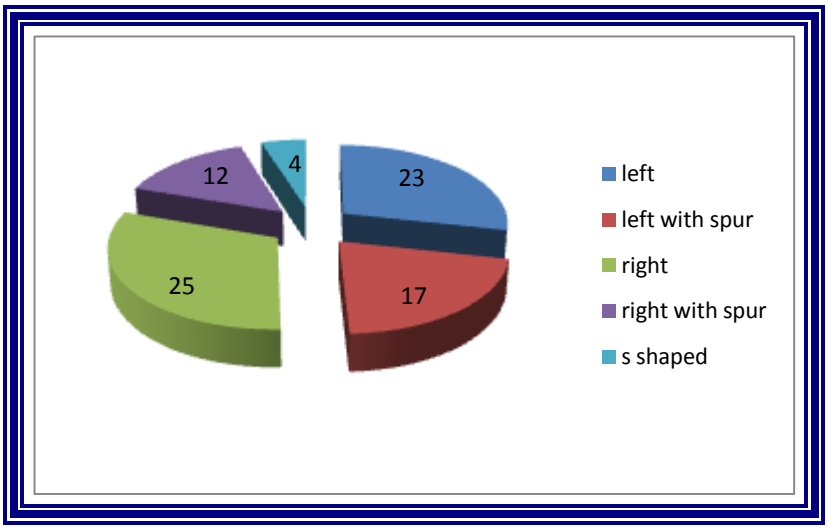


In this study, it can be inferred that >80 % patients with DNS present with nasal obstruction as their only symptom. Anosmia was not present in any patient with only DNS. The presence of anosmia in patients with DNS suggests complication like sinusitis.

Table 15: showing Deviated Nasal Septum on Anterior Rhinoscopy

DNS	Frequency	Percent
Nil	19	19.0
Left	23	23.0
left,spur	17	17.0
Right	25	25.0
right, spur	12	12.0
s shaped	4	4.0
Total	100	100.0

Graph 15: showing Deviated Nasal Septum on Anterior Rhinoscopy



In the present study, around 81 patients had DNS on anterior rhinoscopy. Among them, 40 had DNS to left, 37 to the right and rest had a S shaped DNS.

Table 16: showing other findings on Anterior rhinoscopy

	Frequency	Percent
Bilateral ethmoidal polypi	7	7
Right AC polyp	6	6
Mucopus in the middle meatus	2	2
Total	15	15

In this study, 13 % had polypi on examination, 2 % had mucopus from middle meatus.

Table 17: showing findings on examination of oral cavity and pharynx

oral cavity & Pharynx	Frequency	Percent
Adenoid hypertrophy	1	1.0
Postnasal drip	22	22.0
Tonsillar hypertrophy	4	4.0
Total	27	27.0

In this study, 22 % had postnasal discharge, followed by tonsillar hypertrophy in 4 %, adenoid hypertrophy in 1 %.

Table 18: showing findings on examination of ear

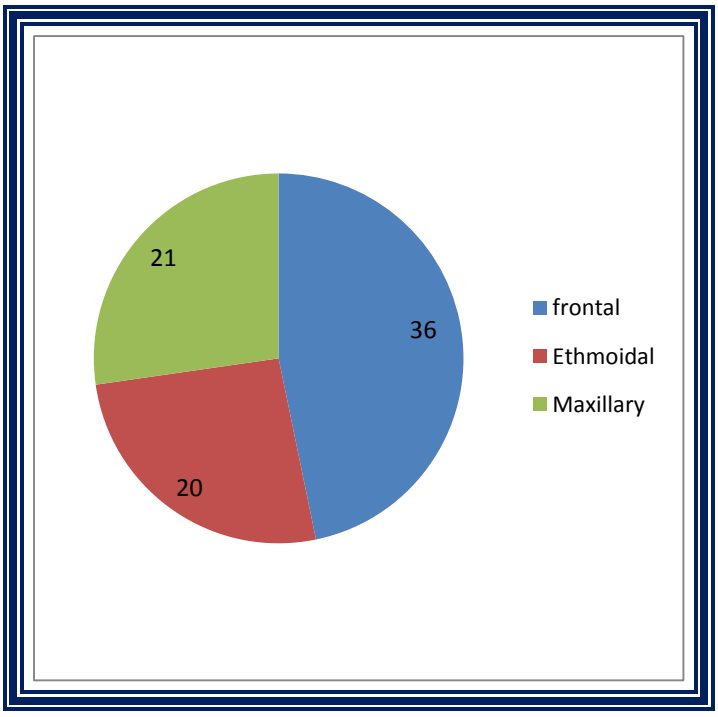
Ear	Frequency	Percent
Bilateral ear wax	1	1.0
Left CSOM	2	2.0
Right CSOM	1	1.0
Retracted TM	3	3.0
Total	7	7.0

This table shows that 3 % cases had chronic suppurative otitis media, and all of these eventually had evidence of sinusitis on examination.

Table 19: showing PNS tenderness in patients with frontal headache

PNS tenderness	Frequency	Percent
Frontal	36	36.0
Ethmoidal	20	20.0
Maxillary	21	21.0

Graph 16: showing PNS tenderness in patients with frontal headache



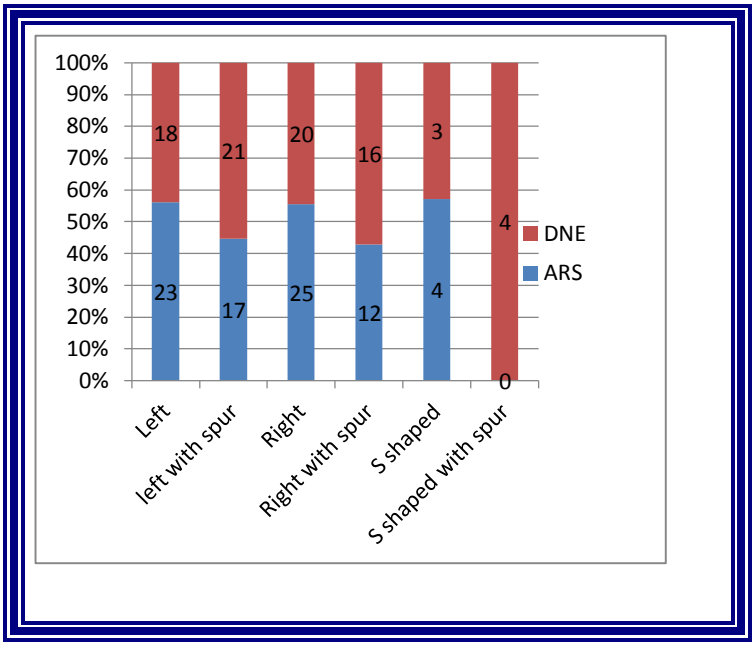
In the present study, 77% had Paranasal sinus tenderness. Among the patients with PNS tenderness, only 53 % had final diagnosis of sinusitis.

FINDINGS ON DIAGNOSTIC NASAL ENDOSCOPY

Table 20: showing Deviated Nasal Septum on DNE

DNS	Frequency on DNE	Frequency on ARS
DNS to left	18	23
DNS to left with spur	21	17
DNS to right	20	25
DNS to right with spur	16	12
S shaped DNS	3	4
S shaped with spur	4	0

Graph 17: showing comparison of DNS on ARS and DNE

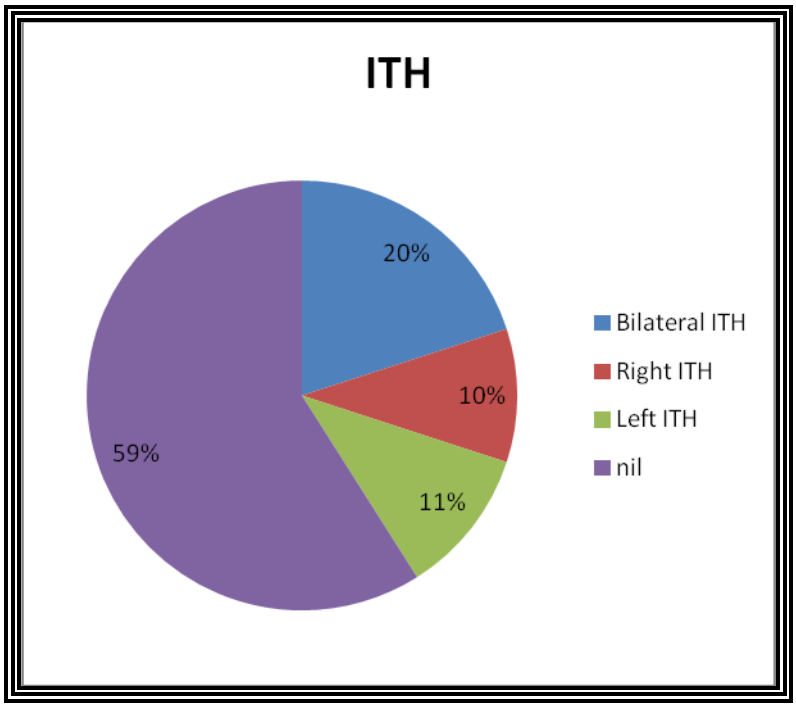


On comparing the results of DNS on Anterior rhinoscopy and DNE, 1 more patient with DNS could be detected on DNE. Also, on Anterior Rhinoscopic examination, spur was missed and detected on DNE. Also a few deviations turned out to be S shaped deviations on DNE.

Table 21: showing Inferior Turbinate hypertrophy on DNE

ITH	Frequency	Percent
Bilateral	20	21.0
Right	10	10.0
Left	11	11.0
No	59	59.0
Total	100	100.0

Graph 18: showing Inferior Turbinate hypertrophy on DNE

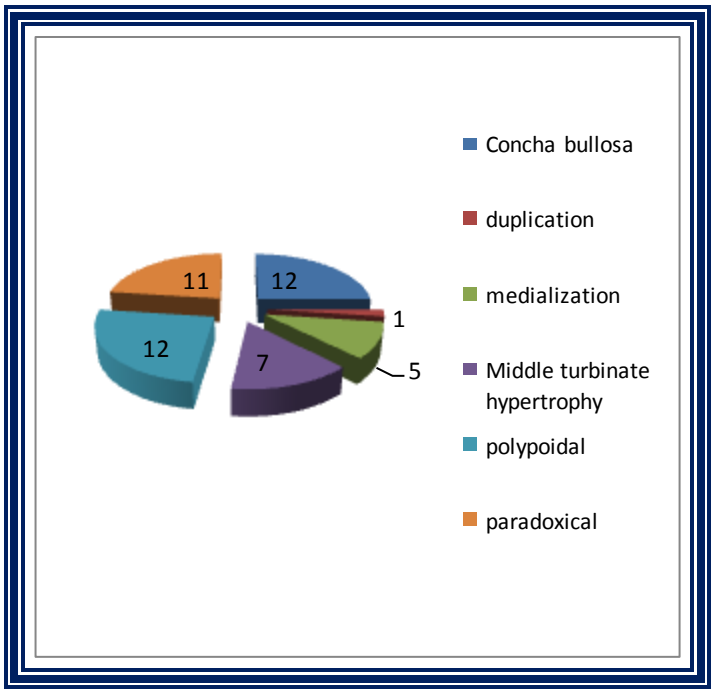


In this study, 41 % patients had Inferior Turbinate Hypertrophy on DNE. 20 % had bilateral ITH, while rest were unilateral.

Table 22: showing variations of Middle Turbinate on DNE

MT	Frequency	Percent
Concha bullosa	12	12.0
Duplication	1	1.0
Medialised	5	5.0
MTH	7	7.0
Polypoidal	12	12.0
Paradoxical	11	11.0
Total	35	35.0

Graph 19: showing variations of Middle Turbinate on DNE

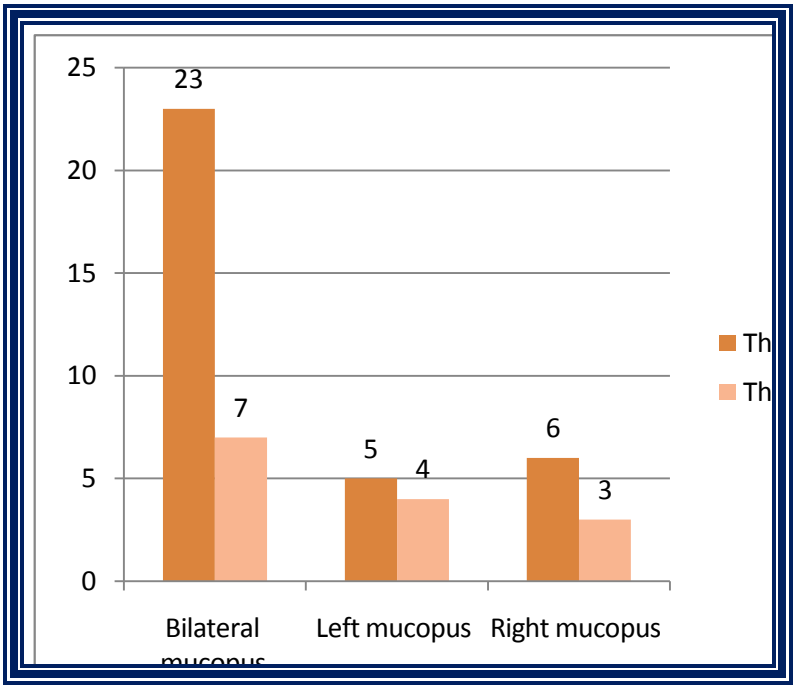


On DNE, anatomical variations of middle turbinate could be clearly seen. Out of all the variations, in this study, Concha bullosa and polypoidal middle turbinate were seen in majority of the patients, each being 12% followed by paradoxical middle turbinate and the rest. All the anatomical variations of middle turbinate were causing sinonasal headache except Middle turbinate hypertrophy and one case each with polypoidal middle turbinate and Middle turbinate hypertrophy which was eventually diagnosed as migraine.

Table 23 : showing presence of discharge in the middle meatus on DNE

Discharge	Frequency	Percent
Bilateral thick mucopus	23	23.0
Bilateral thin mucopus	7	7.0
Left thick mucopus	5	5.0
Left thin mucopus	4	4.0
Right thick mucopus	6	6.0
Right thin mucopus	3	3.0
Total	50	50.0

Graph 20: showing presence of discharge in the middle meatus on DNE

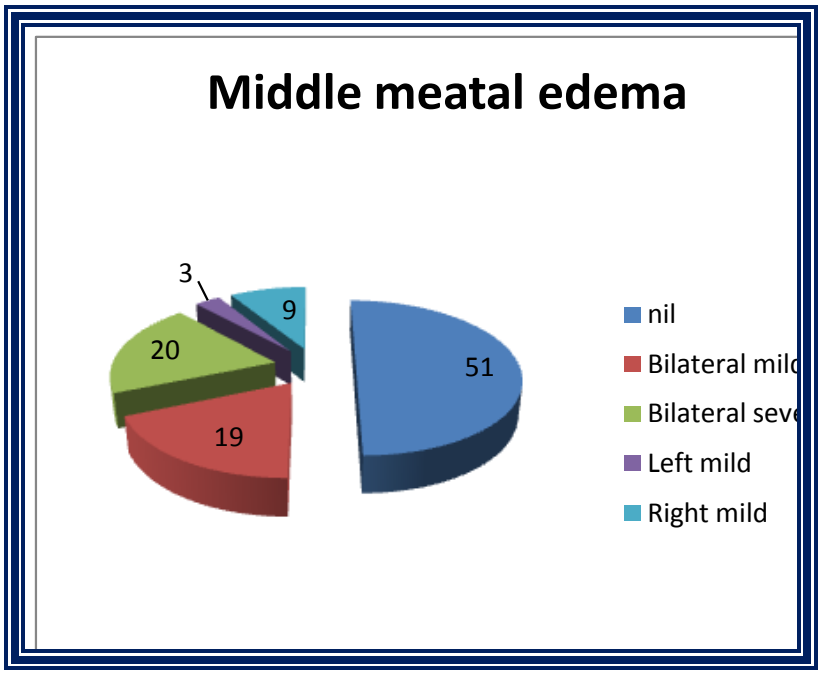


In this study, around 50 % patients had mucopurulent discharge on DNE. Lund & Kennedy endoscopic score was calculated in all of these patients. 23 % cases showed Bilateral thick mucopus on DNE. About 32% cases had thick mucopus, while rest had thin mucopus on DNE.

Table 24 : showing middle meatal edema on DNE

edema	Frequency	Percent
Nil	51	51.0
Bilateral mild	19	19.0
Bilateral severe	20	20.0
left mild	3	3.0
right mild	9	9.0
Total	49	49.0

Graph 21: showing middle meatal edema on DNE

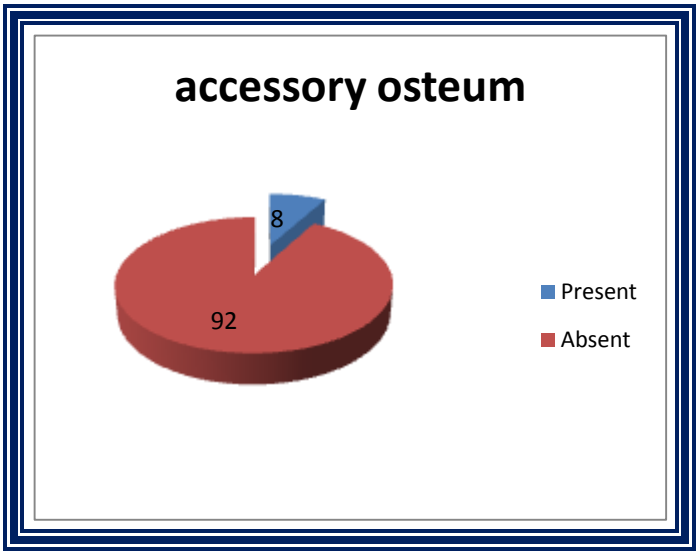


According to this study, edema of middle meatus was seen in 49 % cases in patients with frontal headache and all had sinusitis.

Table 25 : showing accessory osteum on DNE

acc osteum	Frequency	Percent
Yes	8	8.0
No	92	92.0
Total	100	100.0

Graph 22: showing accessory osteum on DNE

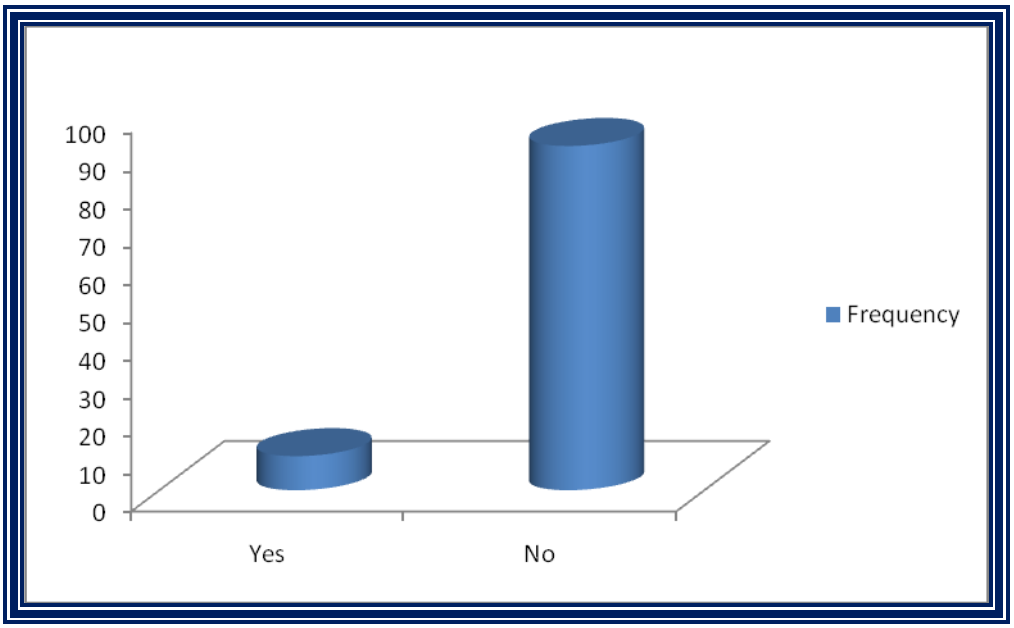


The present study showed presence of accessory osteum in 8 % cases. The presence of accessory osteum did not seem to be diagnostic of sinusitis unless associated with other factors like middle turbinate anomaly or mucopurulent discharge from middle meatus.

Table 26: showing Hyperplastic uncinate on DNE

Hyperplastic Uncinate	Frequency	Percent
Yes	9	9.0
No	91	91.0
Total	100	100.0

Graph 23: showing Hyperplastic uncinate on DNE

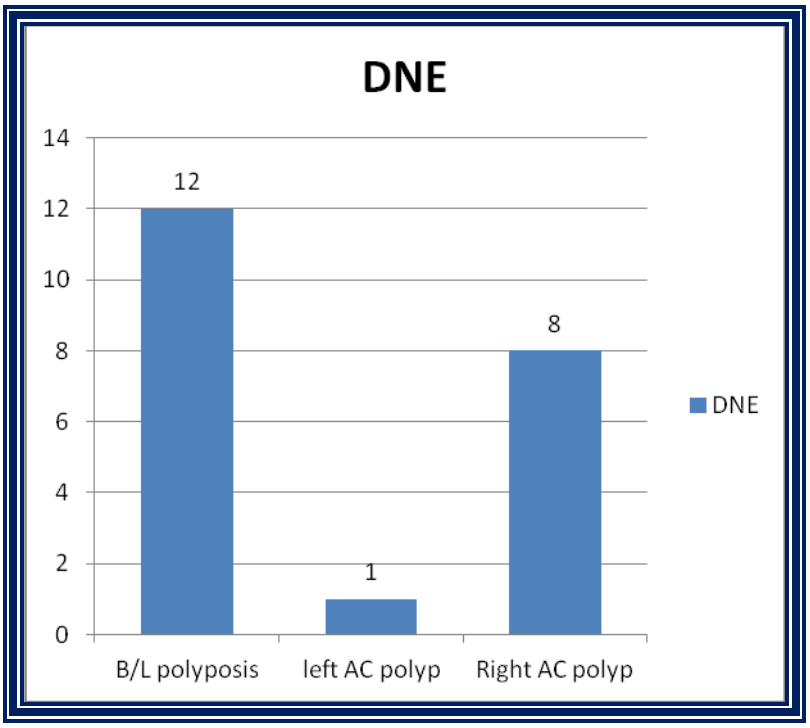


In this study, about 9 % cases with frontal headache had uncinate hypertrophy and all had features of sinusitis.

Table 27: showing presence of polypi on DNE

Polypi	Frequency on DNE	Frequency on ARS
Bilateral ethmoidal polyposis	12	7
Left AC polyp	1	0
Right AC polyp	8	6
Total	21	13

Graph 24: showing presence of polypi on Diagnostic Nasal Endoscopy

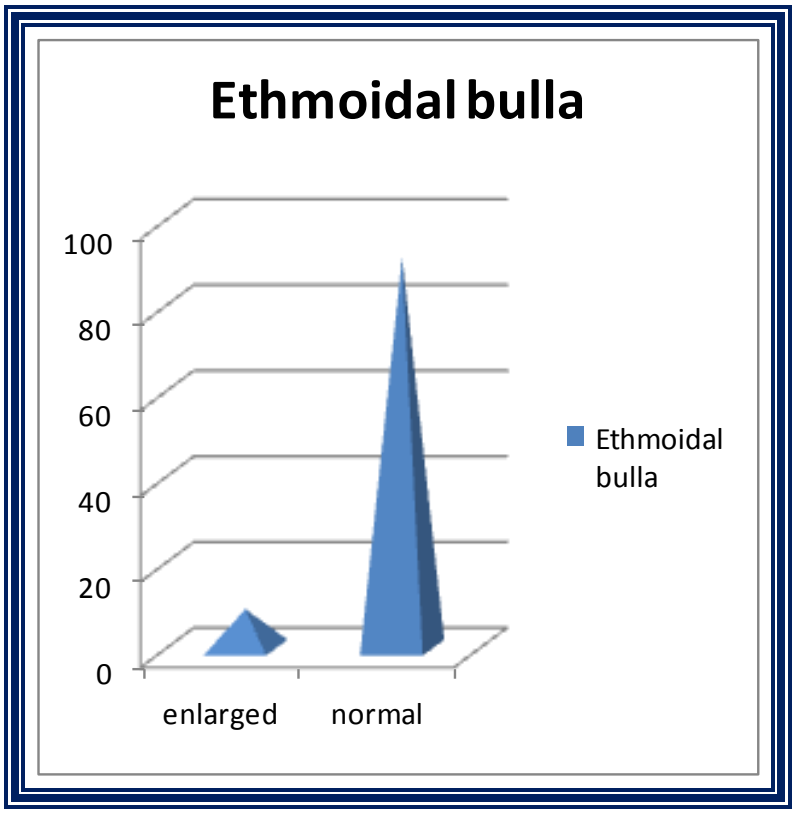


This table shows that 12 % cases had Bilateral ethmoidal polypi, 8 % had right Antrochoanal polyp and 1 % had left Antrochoanal polyp. When compared the presence of polyps on ARS, it was evident that DNE was the ideal method for detecting sinonasal polyposis. Only 13 % polyps were identified on ARS, whereas DNE could detect 21 % cases with polyps.

Table 28 : showing enlarged ethmoidal bulla on DNE

Ethmoidal bulla	Frequency	Percent
Enlarged ethmoidal bulla	9	9.0
Normal ethmoidal bulla	91	91.0

Graph 25: showing enlarged ethmoidal bulla on DNE

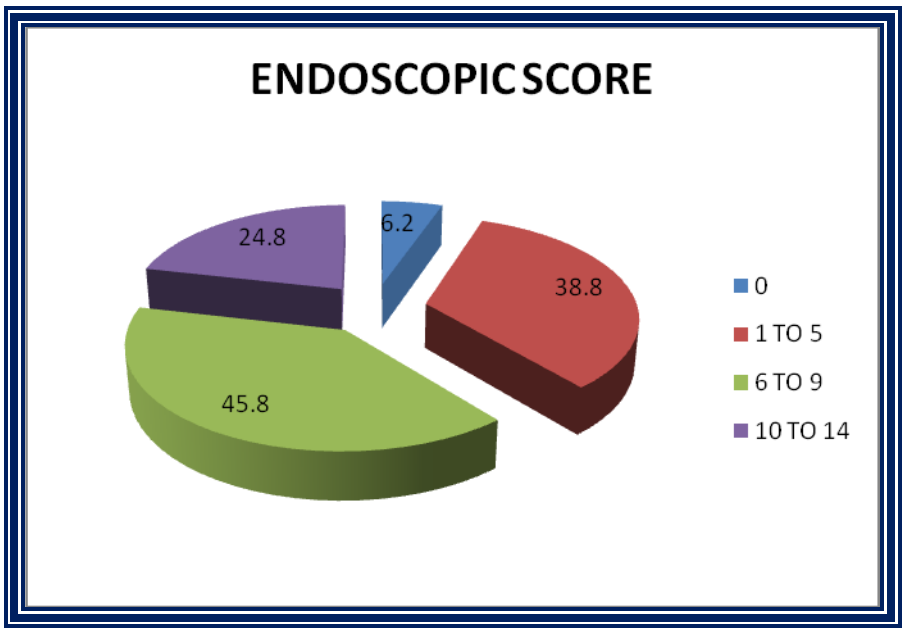


An enlarged ethmoidal bulla was seen in 9 % cases and all had a sinonasal cause for the frontal headache. These could not be seen on Anterior Rhinoscopy

Table 29: showing Lund & Kennedy endoscopic score in patients with rhinosinusitis

Lund & Kennedy endoscopy score	Frequency	Percent of sinusitis
0	4	6.2
1	3	4.6
2	7	10.9
3	6	9.3
4	5	7.8
5	4	6.2
6	14	21.8
7	1	1.5
8	14	22.5
10	4	21.8
12	1	1.5
14	1	1.5

Graph 26: showing Lund & Kennedy endoscopic score in patients with rhinosinusitis

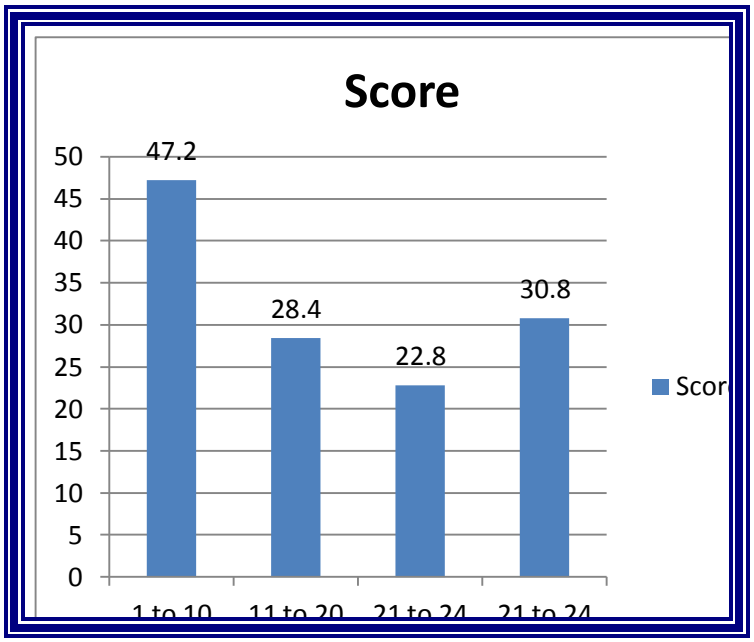


This shows the Endoscopic score in patients with probable diagnosis of sinusitis. This was based on presence of purulent discharge, polyps and edema of the middle meatus. Maximum score of 14 and a minimum of 0 have been noted. More than 45 % with sinusitis had a score of 6 to 9. Higher scores of 6 and above showed increasing severity of sinusitis. All patients with a final diagnosis of pansinusitis had a score of 6 and above.

Table 30 : showing Lund and Mackay CT score of patients with rhinosinusitis

Score	Number	Percent
1	1	2.3
2	1	2.3
3	4	9.5
4	4	9.5
6	2	4.7
8	2	4.7
10	3	7.1
12	3	7.1
16	4	9.5
18	2	4.7
20	3	7.1
21	1	2.3
24	12	28.5

Graph 27: showing Lund and Mackay CT score of patients with Rhinosinusitis



The above table and graph shows more than 45 % patients had a score less than 10, followed by score more than 21 and least score being 1. Majority with a diagnosis of pansinusitis had a score above 21.

Table 30a: Showing maximum, minimum and mean endoscopic and CT scores

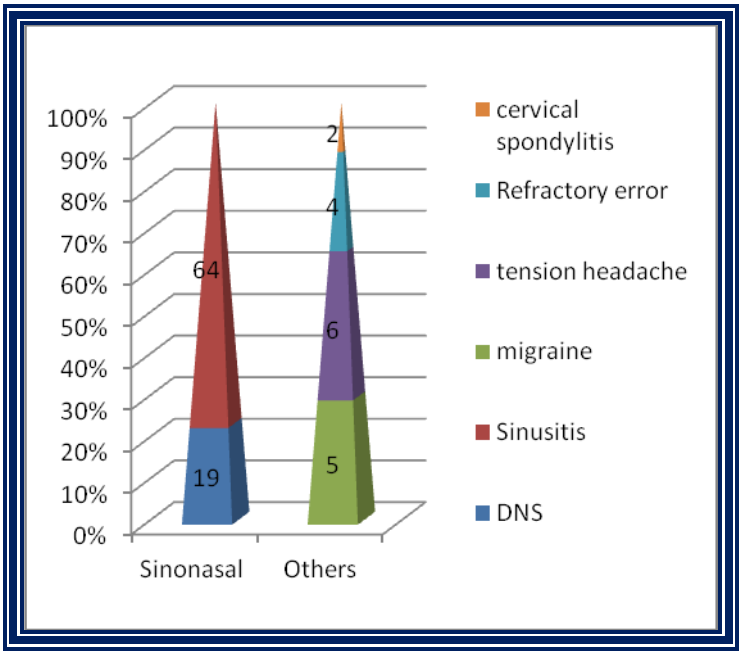
	Number	Minimum	Maximum	Mean	SD
L &K endoscopy score	64	0	14	4.17	3.519
L&M CT score	44	1	24	12.89	8.853

This shows that mean score for Endoscopy and CT were 4.17 and 12.89 respectively.

Table 31: showing provisional diagnosis in patients with frontal headache

Provisional diagnosis	Frequency	Percent
DNS to left with spur	10	10.0
DNS to right with spur	5	5.0
S shaped DNS with spur	4	4
Maxillary sinusitis	21	21.0
Frontal sinusitis	2	2.0
Frontoethmoidal sinusitis	1	1.0
Frontomaxillary	9	9.0
Ethmoidomaxillary	5	5.0
Ethmoidomaxillaryshenoidal	3	3.0
Frontoethmoidomaxillary	7	7.0
Bilateral polyposis	12	12.0
Left AC polyp	1	1.0
Right AC polyp	9	9.0
Pansinusitis	16	16.0
Adenoiditis	1	1.0
allergic rhinitis	7	7.0
preseptal cellulitis	1	1.0
Left dacryocystitis	1	1.0
Migraine	5	5.0
Cervical spondylitis	2	2.0
Refractory error	4	4.0
Tension headache	6	6.0

Graph 28: showing provisional diagnosis in patients with frontal headache

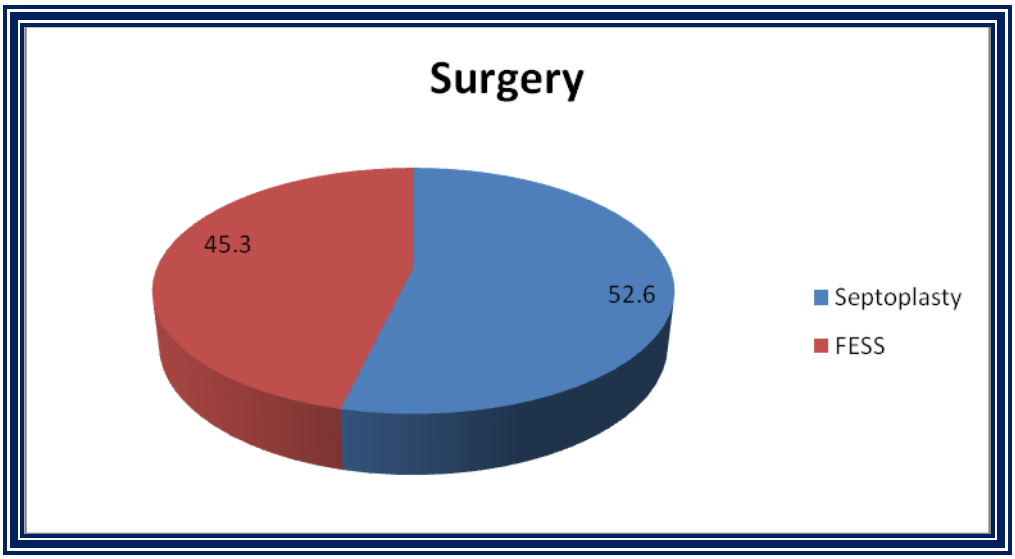


In this study, 83% of the patients had headache attributable to sinonasal origin out of which, 64 % had headache due to sinusitis with maxillary sinusitis accounting for 22%. DNS with spur impinging on inferior turbinate causing headache was seen in 19 % cases. 1case each of adenoiditis, preseptal cellulitis, and left dacryocystitis associated with sinusitis was noted in the study. 7 % cases had allergic rhinitis. Only 17 % had headache due to non sinonasal causes like migraine, Refractory error, Tension headache and cervical spondylitis etc.

Table 32: showing surgery performed in patients with sinonasal headache

Surgery	Frequency	Percent
Septoplasty	10/19	52.6
FESS	29/64	45.3

Graph 29: showing surgery performed in patients with sinonasal headache



Around 52 % cases with DNS underwent septoplasty for relief of their symptoms, whereas more than 50 % cases with rhinosinusitis benefitted from medical management. Majority of the patients had relief of their headache following their respective surgeries.

DISCUSSION

Headache is one of the most common presenting symptom encountered by any physician. Around 95 % young women & 91% young men suffer from headache over a 12 month period.[50] It is the ninth most common symptom which brings a patient to the physician.[3] Frontal is the most common site of headache, which accounts for 60% of patients with headache.[17,48]

The patients with headache may approach a Physician, Neurologist, Ophthalmologist or an Otorhinolaryngologist. Due to the diversity of the symptomatology, sinonasal cause for headache may be effectively ruled out by a thorough clinical examination and diagnostic nasal endoscopy.[48] Hence, this study was conducted in R. L. Jalappa Hospital for one and half years during the period from January 2011 to July 2012 to determine the abnormalities on nasal endoscopic examination of patients presenting with frontal headache. A sample population of 100 was included in the study.

Sex predilection in headache was seen in migraine where females were found to be more commonly affected than males. In sinusitis both the sexes were found to be equally affected.[47] Similar results were seen in this study. Migraine showed a female preponderance. In patients with sinusitis ratio of male to female was 1.28: 1, which was similar to the result of another study by Ling FT. [52]

The incidence of headache increases with age.[47] In an Indian study by Kirtane MV, majority of the patients (78%) were in third decade which was similar to our study which also had 45% patients in third decade.[53]

Geographical distribution of headache was seen more in the urban population, which comprised of more than 90 % cases. This is in accordance with a study which

reported an increased incidence of Chronic rhino sinusitis in people living in urban area.[59]

More than 50 % patients had headache of duration, less than or equal to 1 year. Patients with a provisional diagnosis of Rhinosinusitis suffered from a more chronic headache compared to the incidence in patients with non sinonasal headache.[29]

Diurnal variation of the headache was seen in 15 % of the patients in this study, of these more than 10 % were seen in patients with Sinonasal headache as proved in the literature.[67] In patients with non sinonasal cause for headache, diurnal variation was seen in 4 patients, 2 with cervical spondylosis and rest had tension headache. All these patients had increase in headache towards evening which has been proven in literature.[65, 66]

In this study, the most common symptom to be associated with headache was nasal obstruction in 58%, followed by rhinorrhea in 33%, postnasal drip in 20%, history of allergy in 14 % and anosmia in 7 % cases. Other associated symptoms noted were facial pain in 38 % cases, all of whom had sinusitis. According to a study by Lanza in 1997, facial pain was a major factor in detecting Rhinosinusitis.[61]

In a study conducted in 2011, patients with chronic rhinosinusitis had nasal discharge in 100%, nasal obstruction in 98%, throat irritation in 82%, allergic symptoms in 60 % and anosmia in 12% and facial pain in around 20 %.[7] In this study, 63 % had nasal obstruction, 43 % had rhinorrhea, 40 % with postnasal drip, 15 % with history of allergy and 7 % with anosmia which is similar to another study conducted in 2000.[71]

All the patients with anosmia had eventually bilateral ethmoidal polypi on examination. Around 87 % patients with DNS causing headache had nasal obstruction

as a predominant symptom. The most common presentation in patients with DNS was nasal obstruction (85%) according to a study by Hassan .[27]

Non sinogenic causes of frontal headache had associated symptoms like stress, difficulty in vision, cervical pain etc which is in accordance with several other studies.[65, 66]

On examination, Postnasal drip was seen in 22% cases, tonsillar hypertrophy in 4 %, retracted Tympanic membrane in 3 % and 3 % cases had CSOM. According to another study, 10 % had retracted Tympanic membrane; postnasal drip was seen in 73% cases of rhinosinusitis.[7] The lower incidence of the results of our study could be due to inclusion of patients with non sinogenic headache.

In our study, only 53% cases with Paranasal sinus tenderness had Rhinosinusitis. Thus, tenderness of PNS does not confirm sinus disease which is in accordance with literature.[29]

On Diagnostic nasal endoscopy, Deviated Nasal Septum (DNS) was seen in 82% patients, out of which 39 % had DNS to left, 36% to right and rest had S shaped DNS. In literature, various studies give prevalence of DNS from 3% to 96%.[7, 54, 55] But our study had a result comparable to a study by Danese M .[56] A Deviated nasal septum can impinge upon the lateral wall of nose and cause obstruction of drainage of the sinuses leading to infection.

On comparison of DNS detected on Anterior rhinoscopy and DNE, 1 more patient with DNS could be detected on DNE. The nasal endoscopy could detect posterior deviations and spur better than anterior rhinoscopic examination according to this study.

Hypertrophy of inferior turbinate was seen in 41 %. Unilateral Inferior turbinate enlargement occurred mainly as a result of compensatory hypertrophy due to

DNS on the opposite side. An associated septal spur impinging on the Inferior turbinate results in frontal headache according to a study by Blaugrund.[21]

Variations of middle turbinate noted were hypertrophic turbinate in 7 %, duplication in 1%, medialized in 5 %, paradoxical in 11% and polypoidal turbinate in 12% cases with frontal headache. All these variations were seen in patients with sinonasal headache except one case each of polypoidal and hypertrophied middle turbinate which were noted in 2 cases with migraine. In a study conducted in 1991, paradoxical turbinate was seen in 8.5 %.[54]Concha bullosa was noted in 12% cases and out of these 9% had sinusitis while the rest had DNS with spur causing frontal headache. It was the most common anomaly of the middle turbinate. Enlarged middle turbinate could cause mucosal contact point with the lateral wall structures resulting in sinusitis.[33]

This study shows mucopurulent discharge in 48 % cases, while 2 % had polypoidal mucosa in the middle meatus and all these changes were noted in patients with sinusitis as the final probable diagnosis which was confirmed by either X ray or CT of paranasal sinuses. Various authors have shown that the presence of mucopurulent discharge is a definitive tool for diagnosis of sinusitis in patients with frontal headache.[23, 44]

Presence of accessory osteum was seen in 8 % of patients with frontal headache, out of which 2 % was in patients without a sinonasal cause for headache. Thus, presence of accessory osteum in presence of mucopurulent discharge only indicates sinonasal headache. Other studies in our country show that, accessory osteum was seen in 22% cases and does not indicate sinusitis.[61]

In this study, hyperplastic uncinate had a prevalence of 9 % and all these patients had sinusitis. This is slightly less compared to another study by Liu et al

which reports an incidence of 19 %.[57] A hyperplastic uncinate may obstruct the osteum and predispose to sinusitis.

Nasal endoscopy showed 21 % patients with nasal polyp, out of which 12 % had bilateral ethmoidal polypi while 1 % had left & 8 % right Antrochoanal polyp respectively. This is higher than the incidence of 5% quoted in another a study conducted in 2011 in Africa by Fasunla.[7] More than 50% of patients with bilateral ethmoidal poylpi had history of allergy which has been proved theoretically.[69] These pathological findings in patients with frontal headache are definitive diagnosis of sinusitis.

The ethmoidal bulla is the largest and the most constant anterior ethmoidal air cell. An enlarged bulla can cause obstruction to the Osteomeatal complex leading to frontal, maxillary or ethmoidal sinusitis. In this study, 9 % with headache had an enlarged ethmoid bulla and all these patients had sinusitis. This is slightly lower than the incidence of 17% noted in another study by Lloyd.[58]

Lund & Kennedy endoscopic score was calculated in all patients with sinusitis which constituted 64 % of the patients. The maximum score in the study was 14 and minimum 0. More than 45% cases had an endoscopic score of 6 to 9. All patients with pansinusitis had a score of 6 and above. Hence, in our study, it was found that greater the endoscopic score, more severe the grade of sinusitis.

X ray of Paranasal sinuses, Waters view was taken in all the patients. In some patients with normal X ray PNS and positive Nasal endoscopy, CT paranasal sinuses detected disease in the paranasal sinuses. Hence our study found that Nasal endosocopy was a better tool in assessing headache compared to X ray Paranasal sinuses which is in accordance with several other studies.[45, 70]

CT of paranasal sinuses were done in 46 % of cases with frontal headache. Lund and Mackay scoring was used to grade the CT paranasal sinus in patients with sinusitis. Maximum score of 24 and minimum score of 1 recorded. Endoscopic and CT scores were comparable. Higher the endoscopic score, greater the CT score. This is in accordance in a study by Rosbe KW, who found that nasal endoscopy was moderately sensitive and highly specific in predicting results of CT scanning.[45]

In patients with provisional diagnosis of DNS with spur, 52.6% underwent septoplasty and 45.3% with rhinosinusitis underwent FESS.

A provisional diagnosis of headache due to sinonasal cause was achieved in 83 % while only 17 % were diagnosed as non nasal causes like migraine, refractory error, tension headache etc which is similar to study by Kennedy.[25] In another study by Foroughipur, migraine, tension headache and sinusitis was the final diagnosis in 68, 27 and 5 % of patients with chronic headache respectively. This could have been due to diagnosis without nasal endoscopy in those patients.[4]

Headache due to DNS with spur without an underlying sinusitis was seen in 19 % cases. This is in accordance with another study by Qubilat which reports an incidence of 23 to 58 %.[48]This shows that a DNS may come in physical contact with lateral nasal wall structures causing headache. It may also block the sinus ostium leading to vacuum headache.[48]Hence DNS with spur should be taken as a significant finding in patients with frontal headache.

All patients with acute sinusitis can present with frontal headache. A diagnosis of sinusitis causing headache was seen in 64% cases, out of which 60 % had maxillary component of sinusitis, 35% had frontal, 33 % had ethmoidal, 19% had sphenoidal component of sinusitis. This is in accordance with several other studies, which show that maxillary sinus is most commonly involved in headache.[51]

Affected Sinus	This study	Nair et al
Maxillary	60	72
Ethmoidal	33	65
Frontal	35	55
Sphenoidal	19	35

In our study, one case of inflammation of adenoids tissue associated with DNS with spur was noted. Adenoid hypertrophy and infection can cause headache according to another study.[72]

In patients with fever, chills and headache, sinusitis with its complications like preseptal orbital cellulitis should be looked for as was evident from this study.

CONCLUSION

This study was mainly undertaken to detect nasal endoscopic findings in patients with frontal headache.

The main findings and conclusions from the study are as follows:

I. Majority of the patients were in the third decade of life.

II. The commonest symptoms were nasal obstruction followed by nasal discharge, postnasal drip and anosmia in sinusitis

III. The mean Lund and Mackay CT scan scoring for all symptoms was found to be 12.8 and the mean Lund and Kennedy endoscopic score was 4.1

IV. Both DNE and computed tomography imaging of PNS are important preoperative evaluation tools in detecting pathology and both are complimentary to each other.

V. Middle turbinate abnormalities like paradoxical turbinate, medialization, polypoidal, duplication of the turbinate, concha bullosa & other lateral nasal wall anomalies like enlarged ethmoidal bulla, hyperplastic uncinate can all cause blockage of osteomeatal complex, thereby interfering with the drainage of the paranasal sinuses, leading to sinusitis and headache.

VI. Presence of mucopurulent discharge is a pathognomonic sign of underlying paranasal sinus disease.

VII. Sinonasal anomalies should be primarily considered as the cause for frontal headache in view of positive nasal endoscopic findings.

VIII. DNS with spur causing headache was seen in 19 % cases. A Spur can press on the lateral nasal wall structures resulting in frontal headache.

Hence all patients with frontal headache should be subjected for Diagnostic Nasal Endoscopy

SUMMARY

This study was conducted in R. L. Jalappa Hospital for one and half years during the period from January 2011 to July 2012 to determine the abnormalities on nasal endoscopic examination in patients presenting with frontal headache.

The study included 100 patients who were subjected to both Diagnostic Nasal Endoscopy and X Ray Paranasal sinuses with or without CT Paranasal sinuses after consent. The resultant data was then analysed.

In this study, 45% patients were in the third decade, which were in accordance with other studies

Frontal headache associated with migraine was seen more in females whereas in sinusitis, both the sexes were found to be almost equally affected which were in accordance with other studies.

Patients from urban background had an increased risk of frontal headache which is proven in literature.

The chronicity of frontal headache was more seen in sinonasal causes compared to the others as in literature.

The diurnal variation of frontal headache was seen in 15 % of the patients, of these more than 10 % patients had sinonasal headache. Thus diurnal variation of headache is more common in sinonasal headache which is in accordance with other studies.

The most common symptom associated with frontal headache was nasal obstruction, seen in 58%, followed by rhinorrhea in 33%, postnasal drip in 20%, allergy in 14%, and anosmia in 7 % cases.

Other associated symptoms noted were facial pain in 38 % cases, all of whom had sinusitis. On retrograde analysis of patients with sinusitis, the symptoms noted

were nasal obstruction in 63%, followed by rhinorrhea in 43%, postnasal drip in 40 %, history of allergy in 15 %, anosmia in 7 % which were similar to another study in 2000.

Non sinogenic causes of frontal headache had associated symptoms like stress, difficulty in vision, cervical pain etc which is proven in literature.

Only 53% cases with Paranasal sinus tenderness had Rhinosinusitis. Thus, tenderness of PNS does not confirm sinus disease as in accordance with other studies.

On Diagnostic nasal endoscopy, Deviated Nasal Septum was seen in 82% patients which is proven in literature. DNS to left(39%) was more common than to the right(36%) as in our study.

On comparison of DNS detected on Anterior rhinoscopy and DNE, 1 more patient with DNS could be detected on DNE. Thus, nasal endoscopy could detect posterior deviations and spur better than anterior rhinoscopic examination.

Variations of middle turbinate noted in patients with sinusitis were hypertrophic turbinate in 6 %, duplication in 1%, medialized in 5 %, paradoxical in 11%, concha bullosa noted in 9% cases and polypoidal in 11% cases . 3 % cases with concha bullosa, showed only DNS without sinusitis causing headache. The incidence of most of these variations was slightly lower than the literature, which could be due to the smaller sample size.

Mucopurulent discharge was seen in 48 % cases, while 2 % had polypoidal mucosa in the middle meatus .All these changes were noted in patients with sinusitis as the final probable diagnosis. Thus presence of mucopus in middle meatus is confirmatory of an underlying sinus disease as proven in literature.

Presence of accessory osteum was seen in 8 % of patients with frontal headache, out of which 2 % was in patients without a sinonasal cause for headache.

This is incidence is lower than in literature, which could be due to the smaller sample size.

Hyperplastic uncinate was seen in 9 % and all these patients had sinusitis which is in accordance with other studies.

Nasal endoscopy showed 21 % patients with nasal polypi, out of which 12 % had bilateral ethmoidal polypi while 1 % had left & 8 % right Antrochoanal polyp respectively and this is in accordance with other studies.

An enlarged the ethmoid bulla was noted in 9 % and all these patients had sinusitis which is proven in literature.

In patients with sinonasal cause for headache, DNE showed anatomic abnormalities like, septal spur, mucopurulent discharge from middle meatus, middle turbinate abnormality like middle turbinate hypertrophy, paradoxical turbinate, concha bullosa, polypoidal mucosa. Others noted were enlarged ethmoidal bulla and hyperplastic uncinate. The pathological variations seen in patients with sinonasal headache were mucopurulent discharge and polyps

In patients with non sinonasal cause for headache abnormalities noted were, DNS without spur, inferior turbinate hypertrophy etc. These findings could be seen as a normal anatomic variant and do not have any relation to patients clinical symptoms. It can be seen in patients with both sinonasal and non sinonasal causes for headache as proven in literature.

Lund & Kennedy endoscopic score was calculated in all patients with sinusitis which constituted 64 % of the patients. The maximum score in the study was 14 and minimum 0. More than 45% cases had an endoscopic score of 6 to 9.This is in accordance to other studies conducted.

CT of paranasal sinuses was done in 46 % of cases with frontal headache. Lund and Mackay scoring was used to grade the CT paranasal sinus in patients with sinusitis. Maximum score of 24 and minimum score of 1 were recorded. Endoscopic and CT scores were comparable as proven in literature.

A provisional diagnosis of headache due to sinonasal cause was achieved in 83 % while only 17 % were diagnosed as non nasal causes like migraine, refractory error, tension headache and cervical spondylitis which are supported by some literature while others conclude that non sinonasal causes contribute to headache more than sinusitis. This could be due to diagnosis of sinusitis without a nasal endoscopic evaluation.

A diagnosis of sinusitis causing headache was seen in 64% cases, out of which 60 % had maxillary component of sinusitis, 35% had frontal, 33 % had ethmoidal, 19% had sphenoidal component of sinusitis which is according to literature.

In patients with headache and fever, sinusitis with its complications like preseptal orbital cellulitis should be looked for.

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ANNEXURE-I
PROFORMA

Name:

Age:

Hospital no.:

Date:

Address:

History of presenting complaints:

Headache:

i. Onset:

ii. duration:

iii. unilateral/ bilateral:

iv. progression:

v. diurnal variation:

vi. Type:

Associated symptoms:

1. Nasal obstruction:

i. Onset:

ii. Duration:

iii. Progression

iv. unilateral / bilateral:

v. Diurnal variation

2. Rhinorrhea:

i. duration:

ii. unilateral/ bilateral:

iii. progression:

iv. watery/mucoid/purulent/mucopurulent:

v. diurnal variation:

3. Postnasal drip:

i. onset

ii. duration

iii. progression

iv. watery/ mucoid/ purulent/mucopurulent

4. History of sneezing: episodic/occassional

5. History of loss of smell:

i. Onset

ii. Duration

iii. progression

6. Any other significant symptoms:

a) Decreased vision

b) Photophobia

c) Aura associated with the headache

d) Physical and mental stress

e) Neck pain/stiffness

Past history:

HTN

DM

PTB

Asthma

Any surgery :Yes No

Personal History:

Normal / disturbed sleep

Normal / altered bowel habits

Normal / altered appetite

Habits- Smoking / tobacco chewing / snuff/ alcohol intake

Family history: contributory/ not contributory

General physical examination:

Pulse: /min

BP: mm of Hg

Temp:

R.R: cycles/min

Pallor: Icterus : Oedema :

Cyanosis: Generalised lymphadenopathy: clubbing:

Clinical examination:

Nose: External nose:

Glabella

Root

Dorsum

Tip

Alae

Anterior rhinoscopy:

		RIGHT	LEFT
cold spatula test:			
vestibule:			
septum:			
Lateral wall	1.inferior turbinate:		
	2.inferior meatus :discharge / mass		
	3. middle turbinate:		
	4.middle meatus: discharge / mass		

Posterior rhinoscopy:

Mass: Adenoids/ polyp: R/L

Discharge: R/L

PNS tenderness:

	RIGHT	LEFT
Frontal		
Ethmoidal		
Maxillary		

Oral cavity:

1. Oral cavity:
2. Oropharynx:
3. I.D.L. Examination:

Ear:

	RIGHT	LEFT
Pinna, pre and postauricular region		
EAC		
TM		

Nasal endoscopy:

Septum:

		RIGHT	LEFT
Vestibule			
Inferior turbinate			
Inferior meatus			
Variations of middle turbinate			
Middle meatus	Edema		
	discharge		
	Accessory osteum		
	Uncinate process		
	Ethmoidal bulla		
	Frontal recess		
Agar nasi cells			
Polyps			
Sphenoethmoidal recess			
Eustachian tube opening			

Imaging:

X Ray PNS:

CT PNS:

Blood investigations:

PROVISIONAL DIAGNOSIS:

Treatment given:

Conservative :

Surgical :

ANNEXURE- II

KEY TO MASTER CHART

L- Laterality of headache

DV- Diurnal variation

B- Bilateral

R- Right

L-Left

Y- Present

N- Absent

E - Evening increase of headache

M - Morning increase of headache

N Ob- Nasal Obstruction

Rh- Rhinorrhea

PND- Postnasal drip

All- Allergy

AN- Anosmia

ARS- Anterior Rhinoscopy

Ft- Frontal tenderness

Et- Ethmoidal tenderness

Mt- Maxillary tenderness

DNS- Deviated Nasal Septum

LS- DNS to left with spur

RS- DNS to right with spur

S- S shaped deviation

SS- S shaped with spur

HIT- Inferior Turbinate Hypertrophy

MT- Middle turbinate variations

MM- Middle meatal mucopus

LtM- Left Mild

RtM- Right Mild

BS- Bilateral severe

BM- Bilateral mild

AO- Accessory Osteum

UP- Uncinate Process

HU- Hyperplastic uncinate

CB- Concha Bullosa

Po- Polyps

EP- Ethmoidal polyp

AC R- Right AC polyp

AC L- Left AC polyp

EB- Ethmoidal bulla

EN- Enlarged ethmoidal bulla

L&K- Lund & Kennedy endoscopic score

L&M- Lund & Mackay CT score

CT scan:

AE- Anterior ethmoid

BO- Bilateral OMU block

LM- Left maxillary opacity

LCB- Left concha bullosa

BP- Patent OMU

BS- Bilateral sphenoid opacity

BE- Biltateral Ethmoid opacity

BCB- Bilateral concha bullosa

PS- Pansinusitis

RO- Right OMU block

RE- Right ethmoid opacity

MS-Maxillary Sinusitis

FS- Frontal Sinusitis

FE- Frontoethmoidal sinusitis

FM- Frontomaxillary sinusitis

EM- Ethmoidomaxillary sinusitis

EMS- Ethmoidomaxillarysphenoidal sinusitis

FEM- FrontoEthmoidoMaxillary Sinusitis

PS- Pansinusitis

AR- Allergic Rhinitis

PC- Preseptal cellulitis

AD- Adenoiditis

M- Migraine

CS- Cervical spondylosis

TH-Tension Headache

RE- Refractory error

SP- Septoplasty

FS- Fess