Al-Nahrain University

Collage Of Medicine

Department Of Surgery

COMPARISON BETWEEN ENDOSCOPIC AND CT SCAN FINDINGS IN CHRONIC ALLERGIC RHINOSINUSITIS

A thesis submitted to Al-Nahrain University / College Of Medicine to fulfil the requirement for M.B.ch.B.

Done by:
Sajjad Mohammed Shakir

Supervised by:
Assist. Prof. Dr. Jaafer Mohammed Al-Hassani
(M.B.ch.B. F.I.C.M.S.)

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Abstract

Background:

Allergic rhinosinusitis is a common disease with widespread morbidities that can seriously affect patients' quality of life and work performance; its socioeconomic burden is heavily underestimated. This cross section study aims to compare between endoscopic & CT scan findings in chronic allergic rhinitis.

Material:

The study involved 50 patients with age range between 15-35 years in Al-Imamain Al-Kadhimiyn medical city diagnosed of chronic allergic rhinitis.
The data were collected between December 2018 & February 2019 from ENT department and each patient underwent thorough history taking, physical examination, anterior rhinoscopy, and CT scan.

Results:

22 patients (44%) were male while 28 patients (56%) were female. 6 patients (12%) were under 20 years; 32 patients (64%) were between 20-30 years; and 12 patients (24%) were above 30 years. On endoscopic examination 44 patients (88%) had septal deviation; 18 patients (36%) had abnormal middle turbinate; 20 patients (40%) had nasal polyp; 9 patients (18%) had mucopurulent discharge; 40 patients (80%) had inferior turbinate hypertrophy; 20 patients (40%) had post nasal space examination. On CT scan 10 patients (20%) had retention cyst; 40 patients (80%) had inferior turbinate hypertrophy; 46 patients (92%) had septal deviation; 30 patients (60%) had osteomeatal complex obstruction; 30 patients (60%) had infundibular occlusion; 30 patients (60%) had sinus thickening; 4 patients (8%) had sinus opacification; 20 patients (40%) had nasal polyp; 12 patients (24%) had concha bullosa.

Conclusion:
Deviated nasal septum were the most common finding on nasal endoscopic examination while the less common finding were mucopurulent discharge.
CT scan show that deviated nasal septum were the most common finding while sinus opacification were the less common finding.
Some pathological findings that had been shown on CT scan were not visible on endoscopy and vice versa, which mean that the two tools are completing each other's in the work up.

Key words:
Nose, Endoscopy, CT scan, Allergic Rhinosinusitis

Introduction

Anatomy of the nose: (1)

The **nose** is the part of the respiratory tract superior to the hard palate and contains the peripheral organ of smell. It includes the external nose and nasal cavity, which is divided into right and left cavities by the *nasal septum.*

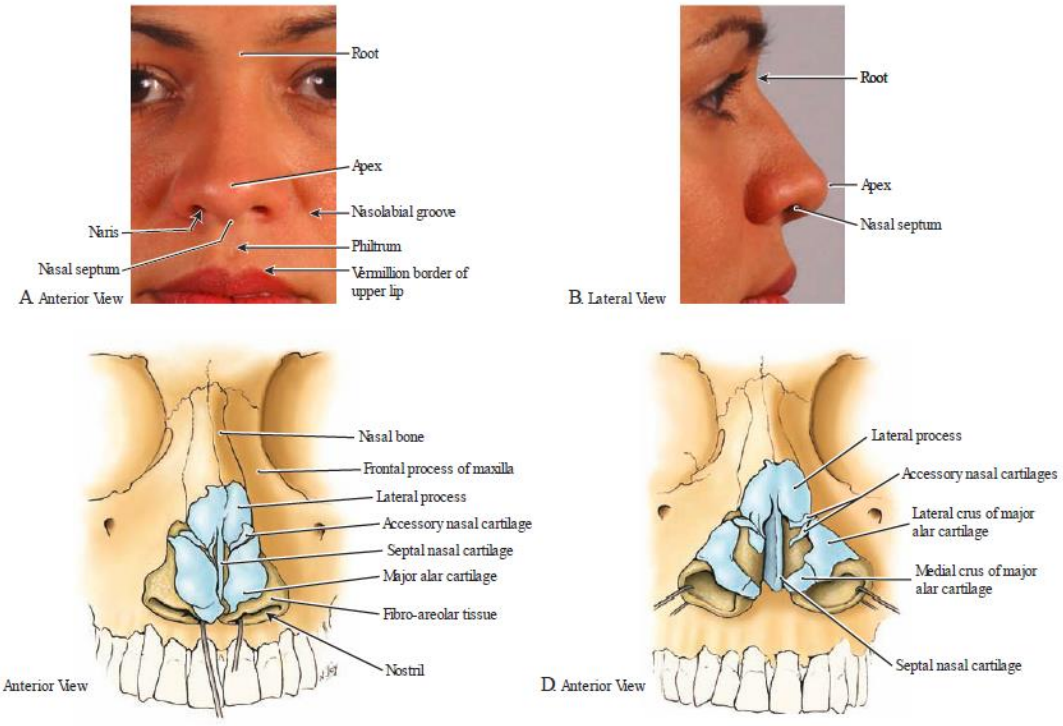

Fig.1: surface anatomy, cartilages, and bones of nose (2)

External nose:

The **external nose** is the visible portion that projects from the face; its skeleton is mainly cartilaginous (Fig. 1).

Noses vary considerably in size and shape, mainly because of differences in these cartilages. The **dorsum of the nose** extends from the **root of the nose** to the **apex** (tip) **of the nose.**

The inferior surface of the nose is pierced by two piriform (L. pear shaped) openings, the **nares** (nostrils, anterior nasal apertures), which are bound laterally by the **alae** (wings) **of the nose.**

The skin over the cartilages of the nose is covered with thicker skin, which contains many sebaceous glands. The skin extends into the **vestibule of the nose**, where it has a variable number of stiff hairs (*vibrissae*).

Skeleton of the external nose:

The supporting skeleton of the nose is composed of bone and hyaline cartilage. The **bony part of the nose** (Figs. 1) consists of the *nasal bones, frontal processes of the maxillae,* the *nasal part of the frontal bone* and its *nasal spine*, and the bony parts of the nasal septum. The **cartilaginous part of the nose** consists of five main cartilages: two lateral cartilages, two alar cartilages, and one septal cartilage. The U shaped **alar cartilages** are free and movable; they dilate or constrict the nares when the muscles acting on the nose contract.

Nasal septum:

The *nasal septum* divides the chamber of the nose into two *nasal cavities.* The septum has a bony part and a soft mobile cartilaginous part. The main components of the nasal septum are the perpendicular plate of the ethmoid, the vomer, and the septal cartilage. The thin **perpendicular plate of the ethmoid bone,** forming the superior part of the nasal septum, descends from the *cribriform plate* and is continued superior to this plate as the *crista galli.* The **vomer,** a thin flat bone, forms the postero inferior part of the nasal septum, with some contribution from the nasal crests of the maxillary and palatine bones. (Fig. 2)

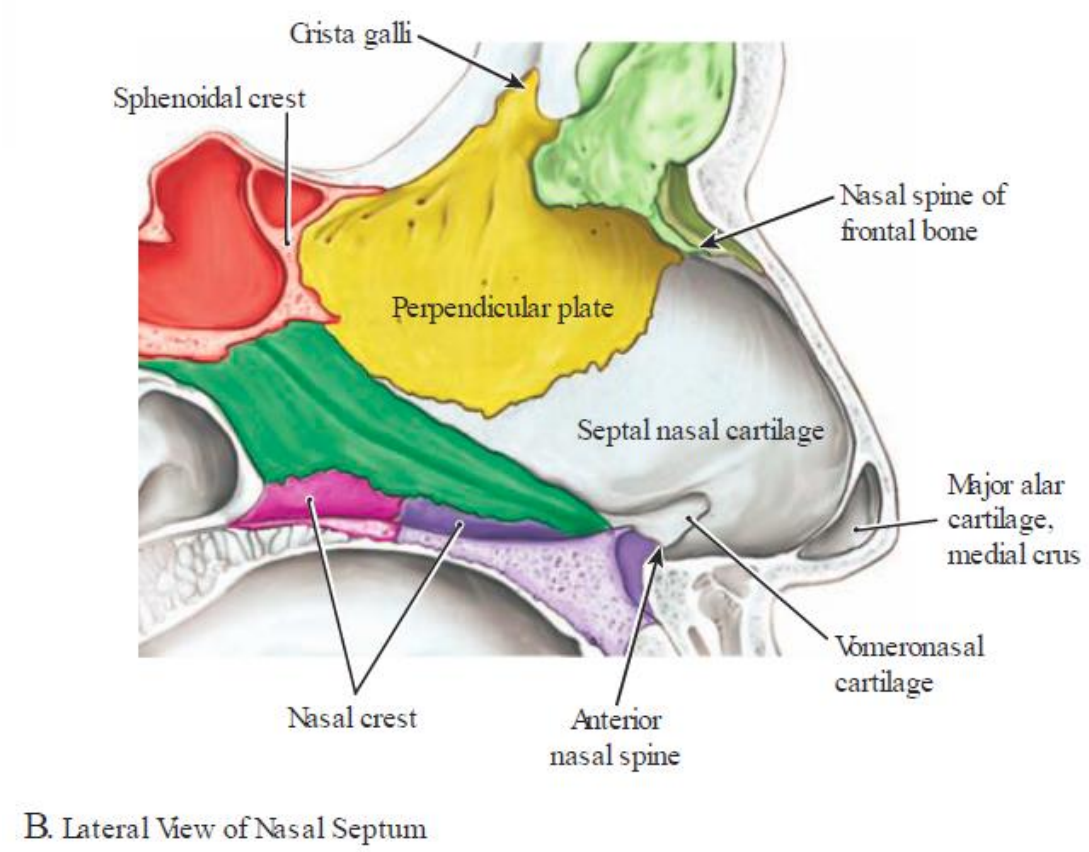

Fig. 2: Lateral view of nasal septum [2]

Nasal cavity:

The term *nasal cavity* refers to either the entire cavity or to the right or left half, depending on the context. The nasal cavity is entered anteriorly through the *nares* (nostrils). It opens posteriorly into the *nasopharynx* through the *choanae*. Mucosa lines the nasal cavity, except for the *nasal vestibule,* which is lined with skin. The **nasal mucosa** is firmly bound to the periosteum and perichondrium of the supporting bones and cartilages of the nose. The mucosa is continuous with the lining of all the chambers with which the nasal cavities communicate: the nasopharynx posteriorly, the paranasal sinuses superiorly and laterally, and the lacrimal sac and conjunctiva superiorly. The inferior two thirds of the nasal mucosa is the respiratory area, and the superior one third is the olfactory area. Air passing over the **respiratory area** is warmed and moistened before it passes through the rest of the upper respiratory tract to the lungs. The **olfactory area** contains the peripheral organ of smell; sniffing draws air to the area.

Boundaries of the nasal cavity:

The nasal cavities have a roof, floor, and medial and lateral walls.

1. The *roof of the nasal cavities* is curved and narrow, except at its posterior end, where the hollow *body of the sphenoid* forms the roof. It is divided into three parts (frontonasal, ethmoidal, and sphenoidal) named from the bones forming each part.

2. The *floor of the nasal cavities* is wider than the roof and is formed by the *palatine processes of the maxilla* and the *horizontal plates of the palatine bone.*

3. The *medial wall of the nasal cavities* is formed by the nasal septum.

4. The *lateral walls of the nasal cavities* are irregular owing to three bony plates, the *nasal conchae,* which project inferiorly, somewhat like louvers.

Feature of the nasal cavity:

The **nasal conchae** (superior, middle, and inferior) curve inferomedially, hanging like louvers or short curtains from the lateral wall. The conchae (L. shells) or turbinate's of many mammals (especially running mammals and those existing in extreme environments) are highly convoluted, scroll-like structures that offer a vast surface area for heat exchange. In both humans with simple plate-like nasal conchae and animals with complex turbinate's, a recess and **nasal meatus** (singular and plural; passage(s) in the nasal cavity) underlies each of the bony formations. The nasal cavity is thus divided into five passages: a poster superiorly placed *spheno-ethmoidal recess,* three laterally located *nasal meatus* (superior, middle, and inferior), and a medially placed *common nasal meatus* into which the four lateral passages open. The **inferior concha** is the longest and broadest of the conchae and is formed by an independent bone (of the same name, inferior concha) covered by a mucous membrane that contains large vascular spaces that can enlarge to control the caliber of the nasal cavity. The **middle** and **superior conchae** are medial processes of the ethmoid bone. When infected or irritated, the mucosa covering the conchae may swell rapidly, blocking the nasal passage(s) on that side.

The **spheno-ethmoidal recess,** lying superoposterior to the superior concha, receives the opening of the *sphenoidal sinus,* an air-filled cavity in the body of the sphenoid. The **superior nasal meatus** is a narrow passage between the superior and the middle nasal conchae into which the posterior ethmoidal sinuses open by one or more orifices. The **middle nasal meatus** is longer and deeper than the superior one. The anterosuperior part of this passage leads into a funnel-shaped opening, the **ethmoidal infundibulum,** through which it communicates with the frontal sinus. The passage that leads inferiorly from each frontal sinus to the infundibulum is the *frontonasal duct*. The **semilunar hiatus** (L. *hiatus semilunaris*) is a semicircular groove into which the frontal sinus opens. The **ethmoidal bulla** (L. bubble), a rounded elevation located superior to the semilunar hiatus, is visible when the middle concha is removed. The bulla is formed by middle ethmoidal cells that form the *ethmoidal sinuses.* The **inferior nasal meatus** is a horizontal passage infer lateral to the inferior nasal concha. The *nasolacrimal duct,* which drains tears from the lacrimal sac, opens into the anterior part of this meatus. The **common nasal meatus** is the medial part of the nasal cavity between the conchae and the nasal septum, into which the lateral recesses and meatus open.

Vasculature and Innervation of Nose

The *arterial supply of the medial and lateral walls of the nasal cavity* is from five sources: *(Fig. 3) & (Fig. 4)*

1. *Anterior ethmoidal artery* (from the ophthalmic artery).
2. *Posterior ethmoidal artery* (from the ophthalmic artery).
3. *Sphenopalatine artery* (from the maxillary artery).
4. *Greater palatine artery* (from the maxillary artery).
5. *Septal branch of the superior labial artery* (from the facial artery).

The first three arteries divide into lateral and medial (septal) branches. The greater palatine artery reaches the septum via the incisive canal through the anterior hard palate. The anterior part of the nasal septum is the site of an anastomotic arterial plexus involving all five arteries supplying the septum (*Kiesselbach area*). The external nose also receives blood from first and fifth arteries listed, plus nasal branches of the infraorbital artery and the lateral nasal branches of the facial artery.

A rich **submucosal venous plexus,** deep to the nasal mucosa, provides *venous drainage of the nose via* the sphenopalatine, facial, and ophthalmic veins. The plexus is an important part of the body's thermoregulatory system, exchanging heat and warming air before it enters the lungs. Venous blood from the external nose drains mostly into the facial vein via the angular and lateral nasal veins. However, recall that it lies within the "danger area" of the face because of communications with the *cavernous* (*Dural venous*) *sinus* (see the blue box "Thrombophlebitis of Facial Vein,"). Regarding its *nerve supply of the nose,* the nasal mucosa can be divided into postero-inferior and anterosuperior portions by an oblique line passing approximately through the anterior nasal spine and the spheno-ethmoidal recess.

The nerve supply of the postero-inferior portion of the nasal mucosa is chiefly from the maxillary nerve, by way of the *nasopalatine nerve* to the nasal septum (Fig. 5) , and posterior superior lateral nasal and inferior lateral nasal branches of the *greater palatine nerve* to the lateral wall (Fig. 6). The nerve supply of the anterosuperior portion is from the ophthalmic nerve (CN V1) by way of the **anterior** and **posterior ethmoidal nerves,** branches of the nasociliary nerve. Most of the external nose (dorsum and apex) is also supplied by CN V1 (via the infratrochlear nerve and the external nasal branch of the anterior ethmoidal nerve), but the alae of the nose are supplied by the nasal branches of the infra-orbital nerve (CN V2).

The **olfactory nerves,** concerned with smell, arise from cells in the **olfactory epithelium** in the superior part of the lateral and septal walls of the nasal cavity. The central processes of these cells (forming the olfactory nerve) pass through the *cribriform plate* and end in the **olfactory bulb,** the rostral expansion of the **olfactory tract.**

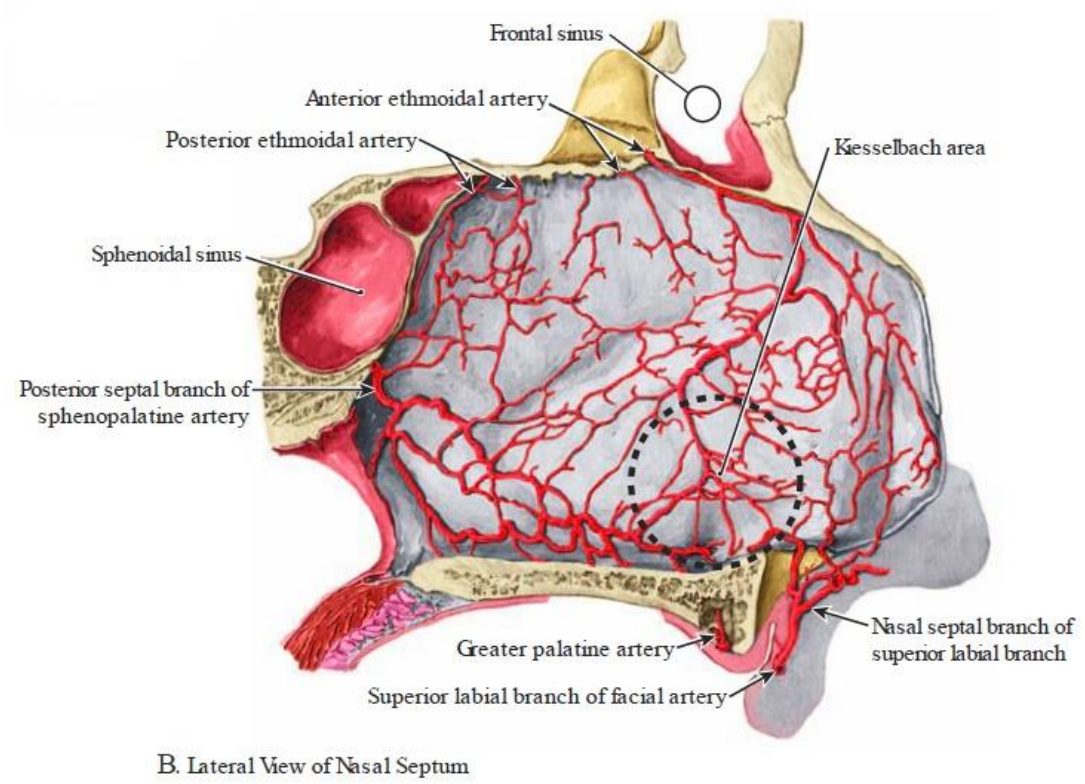

Fig. 3: arterial supply to the Lateral aspect of Nasal Septum [2]

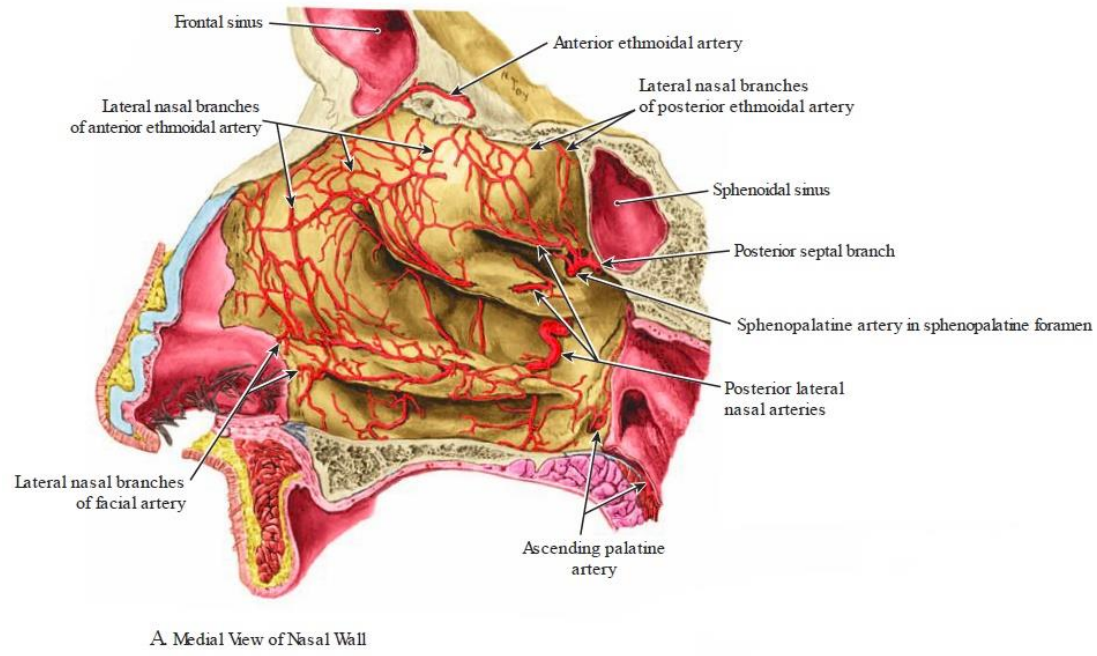

Fig. 4: arterial supply to the Medial aspect of Nasal Wall [2]

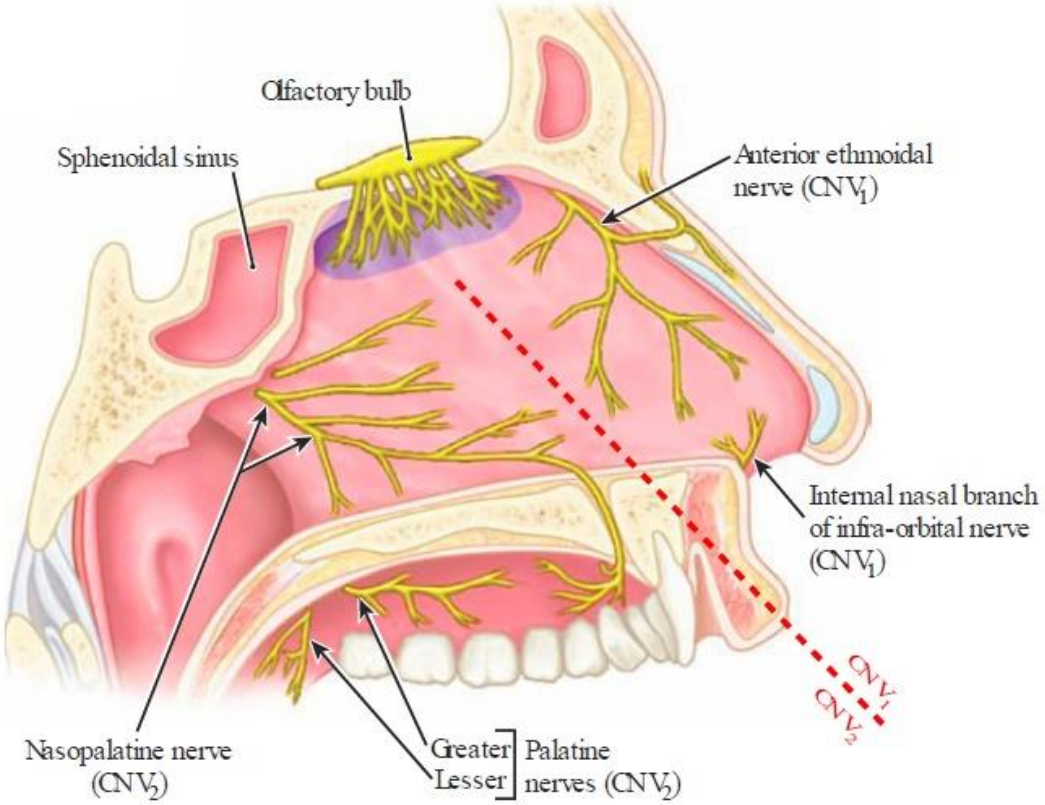

Fig. 5: Innervation of Lateral aspect of Nasal Septum [2]

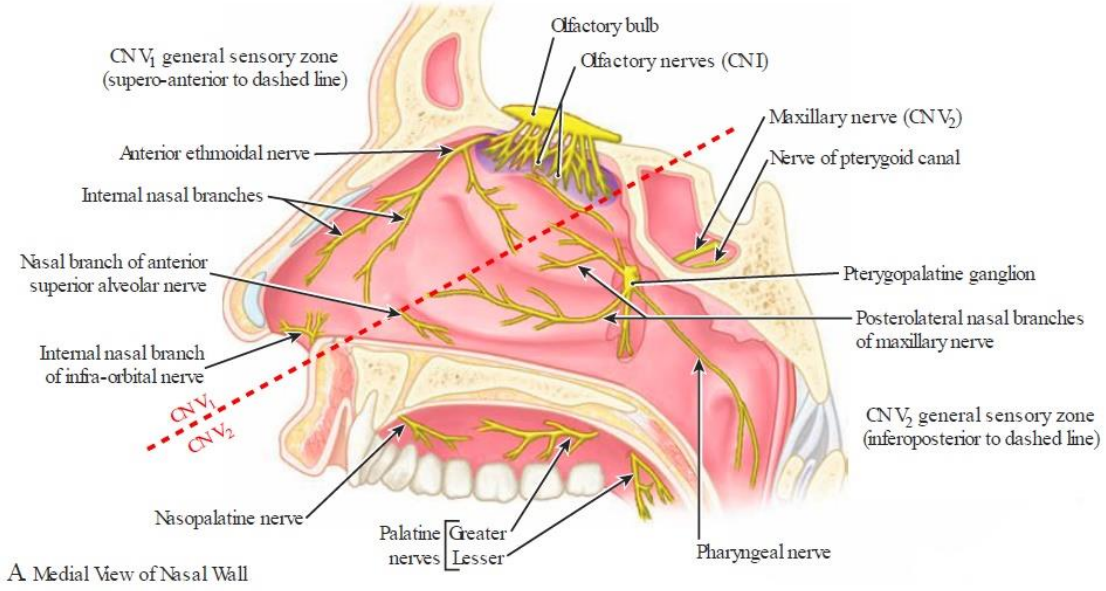

Fig. 6: Innervation of Medial aspect of Nasal Wall [2]

Physiology of the nose: (3)

1. **Olfaction**

Receptors are genuine neurons (unlike photoreceptors and hair cells) unlike other neurons receptors, are continually regenerate
Small is produced by chemical detection
Olfactory compounds must water and lipid soluble and must the mucosa to produce a smell

2. **Passage for respiration**

The nose act as the conduct of inspired and expired air
Nasal flow is also controlled by nasal cycle. Nasal cycle is the rhythmic cyclical congestion and decongestion of mucosa of nasal cavities.
These cyclical change take place every 3-4 hours and is constant in every person.
The nasal cycle is observed in up to 80% of normal subjects, must of whom are unaware of the alteration in air flow since the total resistance remine constant. The alteration cycle of congestion and decongestion on each side of the nose is under the control of the autonomic innervation of the nose.

3. **Filtration of inspired air**

The vibrissae trap large dust particles, while finer particles are cleaned by the mucous blanket enzymes, antibodies, and immune cells

4. **Air conditioning of inspired air**

The nose conditions this air by warming and humidification.
The temperature of the inspired air increase nearly body temperature by the time it reaches the pharynx. Similarly, the humidity increase to 100%. Upon expiration, the nose removes water from the expired air, thus maintaining hydration, removes heat, and preventing hypothermia

5. **Protection of the lower airway**

The nasal mucosa is rich in the goblet cells and secretory glands that secrete mucous which forms a blanket has an outer viscous layer and an inner serous layer
This inner serous layer is in contact with the ciliary ends which are constantly beating, resulting in a conveyor belt like motion propelling the mucous blanket onwards to the nasopharynx to be swallowed. About 1-1.15 pints of mucous are produced each day.

6. **Vocal resonance**

The nose helps in the production of nasal consonants (n, m, and ng) by allowing some air to escape through it

7. **Nasal reflexes**

Nasogastric reflexes, sneezing, nasobronchial and nasopulmonary reflexes.

8. **Drainage of tears**

Obstruction of this drainage leads to over flow of tears from the eyes a condition called epiphorea

9. **Ventilation of paranasal sinuses and the Eustachian tube**

Chronic allergic rhinitis

Definition:

Rhinitis is a common disease with widespread morbidities that can seriously affect patients' quality of life and work performance; its socioeconomic burden is heavily underestimated. The term rhinitis comprises heterogeneous diseases, of which allergic rhinitis is the best understood. (4)

It is an IgE mediated type I hypersensitivity response of nasal mucosa to air-borne allergens and is characterized by watery nasal discharge, nasal obstruction, sneezing and itching in the nose. These symptoms must last for at least two consecutive days and for more than one hour most days

This may also be associated with symptoms of itching in the eyes, palate and pharynx. (5)

Pathogenesis: (5)

Inhaled allergens produce specific IgE antibody in the genetically predisposed individuals. This antibody becomes fixed to the blood basophils or tissue mast cells by its Fc end. On subsequent exposure, antigen combines with IgE antibody at its Fab end. This reaction produces degranulation of the mast cells with release of several chemical mediators, some of which already exist in preformed state while others are synthesized afresh. These mediators are responsible for symptomatology of allergic disease. **A "priming affect"** has also been described, i.e. mucosa earlier sensitized to an allergen will react to smaller doses of subsequent specific allergen. It also gets "primed" to other non-specific antigens to which patient was not exposed.

Clinically, allergic response occurs in 2 phases:

(a) Acute or early phase. It occurs immediately **within 5-30 min, after exposure** to the specific allergen and consists of sneezing, rhinorrhea nasal blockage and/or bronchospasm. It is due to release of vasoactive amines like histamine.

(b) Late or delayed phase. It occurs **2--8 hours after exposure** to allergen without additional exposure. It is due to infiltration of inflammatory cells-eosinophil, neutrophils, basophil, monocytes and CD4 + T cells at the site of antigen deposition causing swelling, congestion, thick secretion. In the event of repeated or continuous exposure to allergen, acute phase symptomatology overlaps the late phase.

Classification:

1. Seasonal Allergic Rhinitis: Hay fever and summer colds are common terms for seasonal AR which produce stuffy/runny nose, paroxysm of sneezing and itchy nose/eyes/throat and excess mucus in nose/throat. The condition may be a mere nuisance, or interferes with work and recreation. Pollens of common trees often cause early springtime hay fever while late springtime pollens come from the grasses.

2. Perennial Allergic Rhinitis: Perennial rhinitis is caused by allergens that are present through all seasons, and they include animal dander (cats, dogs, horses and other pets, wool and feathers), cosmetics, molds, foods and house dust. (6)

The terms *seasonal* and *perennial* were replaced by *intermittent* and *persistent* AR. Also, the assessment of the severity of disease has changed from symptoms only to quality-of-life issues, and forms an important aspect of the new classification (**Table 1**).

Intermittent Symptoms	<4 days/week or for <4 consecutive weeks
Persistent Symptoms	>4 days/week or for >4 consecutive weeks
Mild severity	No sleep disturbance; no impairment of daily activities, leisure, or sport; no impairment of school or work; symptoms present but are not troublesome
Moderate/severe	Sleep disturbance; impairment of daily activities, leisure, or sport; impairment of school or work; troublesome symptoms

Table 1: classification of chronic allergic rhinitis. (4)

Nasal Endoscopy: (4)

In contrast to anterior rhinoscopy, endoscopy introduces brilliant illumination and permits greatly improved, magnified direct visualization of the nasal cavity, turbinate's, septum, drainage pathways of the paranasal sinuses, and, in postsurgical patients, the sinus cavities themselves. There are two types of endoscopes that are widely available for evaluating the Sino nasal passages—flexible fiber optic endoscopes and rigid endoscopes/telescopes (**Fig. 7**).

Flexible endoscopes allow for more comfortable visualization of the nasopharynx, Eustachian tube orifices, as well as the larynx to detect signs of extra esophageal reflux. In patients with prior sinus surgery, flexible endoscopes provide greater visualization into the maxillary, sphenoid, and frontal sinuses. This is especially true for lateral recesses of the sphenoid and frontal sinuses as well as the floor of the maxillary sinus.

Although the imaging quality of flexible endoscopes has been significantly enhanced by digital video chip technology, rigid endoscopes still offer superior image clarity.

Furthermore, rigid endoscopy greatly facilitates surgical instrumentation of the nose and sinuses, such as obtaining cultures or biopsies, controlling epistaxis, or performing surgery. The zero-degree endoscope is the easiest to maneuver in the nasal cavity, whereas angled rigid endoscopes (e.g., 30-degree nasal endoscope) can be used to visualize structures that are not in the direct line of sight and offer superior visualization of the lateral nasal wall, skull base, and frontal recess. The 45-, 70-, and 90-degree endoscopes are used for the visualization of challenging frontal recess and maxillary sinus pathology.

Unless contraindicated, topical vasoconstrictive and anesthetic agents are typically used to facilitate nasal endoscopy.

Some clinicians and patients, however, prefer not to use topical anesthesia. This does help demonstrate active mucociliary clearance in vivo because the ciliary function is deactivated by topical anesthesia; however, intolerance of endoscopy without anesthesia may limit the completeness of the evaluation. Although endoscopy is generally a very safe and well- tolerated procedure, the most common adverse effects of endoscopy are patient discomfort pain, nasal bleeding, and feeling faint or lightheaded

from anxiety. Smaller diameter telescopes and flexible scopes are recommended for pediatric use or for use in patients with difficult nasal anatomy.

Indications for Nasal Endoscopy: [4]

Indications for nasal endoscopy include (but are not limited to) the following:

1. Sino nasal symptoms refractory to appropriate empiric therapy or in suspected chronic rhino sinusitis
2. Unilateral disease without septal deviation
3. Severe and disabling symptoms attributed to the nose or sinuses
4. Actual or impending complications of Sino nasal disease
5. Immunocompromised patients who have Sino nasal complaints (transplant, diabetes, leukemia, etc.)
6. Evaluation of surgical treatments after sinus surgery and/or trauma

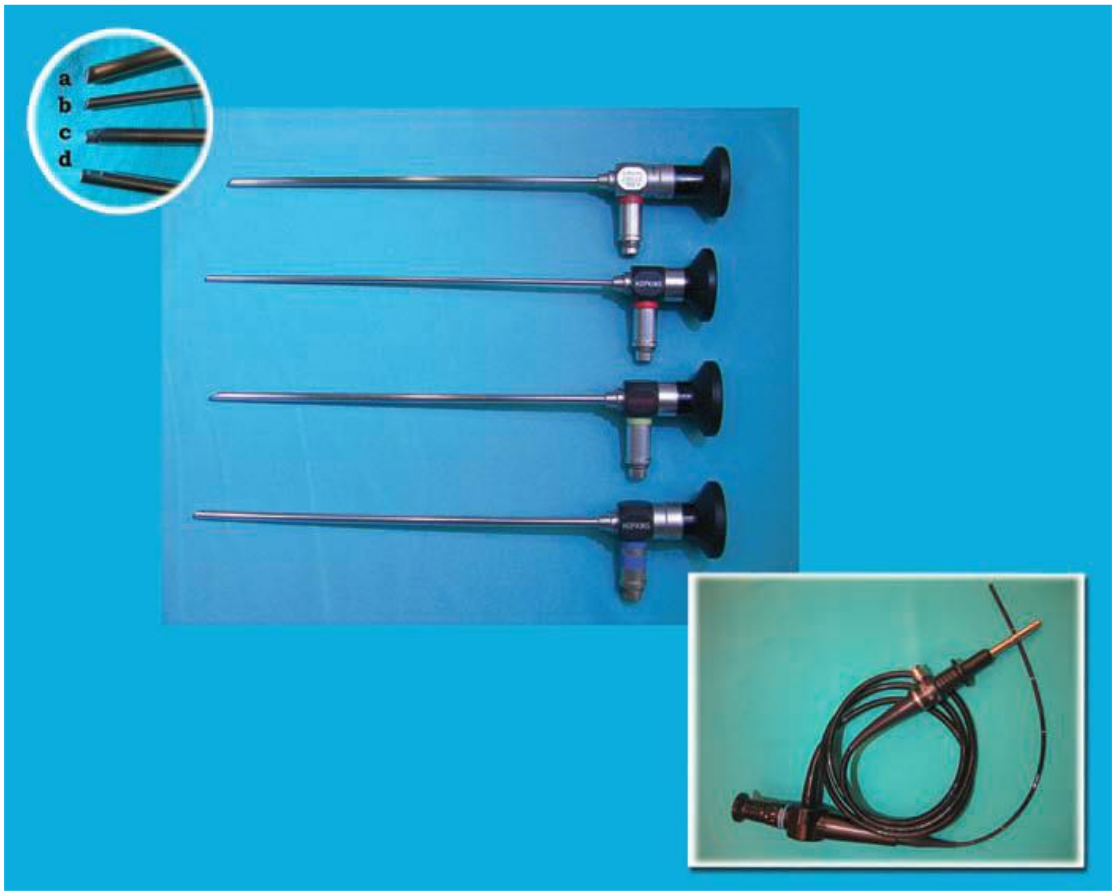

Fig. 7: flexible fiber optic endoscopes and rigid endoscopes/telescopes [4]

Computerized Tomography Scans:

Currently, CT scans are considered the standard of care for imaging the paranasal sinuses and have replaced conventional radiographs for the assessment of rhino sinusitis.

CT imaging and endoscopy should be viewed as complementary methods of patient evaluation. Repeat CT imaging to assess the interval change or response to treatment may be advisable when there is a paucity of findings on nasal endoscopy but persistent sinus mucosal disease is suspected.

CT scans provide excellent bone detail, and when using the proper windowing, they are sensitive in detecting small amounts of mucosal swelling.

There are now many modalities for obtaining CT images, including screening sinus CT, spiral CT, and point-of-service cone beam CT. These vary in radiation dose, cost, image detail, and clarity. CT images obtained in the axial or coronal plane, using bone window algorithm, are generally sufficient to establish the diagnosis of rhino sinusitis. Triplanar reconstruction and soft tissue windows provide additional important anatomic detail but are not required for the diagnosis of rhino sinusitis. Intravenous contrast usually is not required unless there is a concern about tumors or an infectious orbital or intracranial complication.

The risk of radiation from sinus CT imaging is generally perceived to be small. However, the growing use of this technology has raised concern over radiation exposure related to repeat imaging, especially in children. The organs most likely to be affected by a cumulative radiation dose are the lens of the eye and the thyroid gland.

Appearance of CT images is affected by “window width” and “window center” that are arranged according to Hounsfield units (HU: unit of X-ray attenuation based on water where air has a value of 21,000; water, 0; and compact bone/metallic density, 11,000). Bone windowing for sinus disease is generally evaluated with a window width of 2,300 and a center level of 300 HU.

The windowing can be adjusted in many CT image software systems to enhance the contrast between high-density areas and surrounding inflammatory tissue.

If the windowing is improperly applied, misinterpretations of findings on CT scans are possible. For example, with soft tissue windowing, which was developed for evaluating the orbit or brain, fine bone

detail is lost and soft tissue swelling of the sinus mucosa could be more difficult to evaluate. (4)

Indications for CT scan:

1. Extension of mucosal tumors of suprahyoid neck and metastatic neck lymph nodes (ring enhancement)
2. Postoperative neck
3. Salivary gland tumors and metastatic neck lymph nodes
4. Computed tomography sialography
5. Cervical lymphadenopathy
6. Trauma, inflammation and cancer of larynx and laryngopharynx with metastatic neck nodes
7. Large or fixed thyroid tumors invading and compressing larynx, laryngopharynx, trachea and mediastinum
8. Paranasal sinuses prior to endoscopic sinus surgery, severe nasal polyposis, tumors
9. Facial trauma
10. Temporal bone and skull base tumors, semicircular canal fistulas, cochlear implants. (6)

Aim of study

This descriptive study aims to compare between endoscopic & CT scan findings in chronic allergic rhinitis.

Materials and methods

This descriptive study was done in Al-Imamain Al-Kadhimiyn medical city and the data were collected between December 2018 & February 2019 from ENT department. The study involved 50 patients with age range between 15-35 years diagnosed of chronic allergic rhinosinusitis.

Inclusion criteria was the presence of nasal symptoms suggestive for AR, such as:

1. Nasal itching
2. Sneezing
3. Watery rhinorrhea
4. Nasal obstruction.

Exclusion criteria were:

1. Patients' symptoms that not fulfil the criteria of allergic rhinosinusitis
2. Restless children
3. Those who refuse doing nasal endoscopy
4. Those with narrow nasal fossa due to anatomical abnormalities
5. Those who didn’t comeback for CT scan follow up.

The study was approved by the local review board and informed consent was obtained from the patients.

Study Design: All patients were evaluated by history, clinical exam, nasal endoscopy, and CT scan. Endoscopy was performed with a rigid endoscope, diameter 4 mm, with a zero degree angle of vision (Karl Storz 7207; Karl Storz, Tuttlingen, Germany), and with a 300-W cold light source (Storz Xenon Nova; Karl Storz) and a light cable of 1.8 mm length. Endoscopy was video recorded by a microcamera connected to digital recorder set (Karl Storz Tele Pack; Karl Storz).

The patiets were placed in a setting position. Cotton wool soaked with anesthetic solution (xylocain 10%) was placed into the nose for 5 minutes.

Briefly, the nasal fossa was evaluated in three steps:

1. The inferior examination consists of passing the nasal endoscope along the floor of the nose to visualize the floor of the nasal cavity, the inferior turbinate/ meatus, nasal septum, and the Eustachian tube orifice as well as the nasopharynx. Occasionally, the lacrimal drainage at Hasner's valve can be observed within the inferior meatus.

2. The second passage of the telescope evaluates the nasal valve anteriorly and superiorly, the nasal septum, the anterior middle turbinate, the olfactory cleft, the sphenoethmoid recess, the superior turbinate, and occasionally, the sphenoid sinus ostium.

3. The third passage occurs by rolling the endoscope into the middle meatus posteriorly and examining the basal lamella attachment of the middle turbinate to the lateral wall as well as the ostiomeatal complex, the uncinate process, and possibly, the anterior ethmoid bulla.

General information:

NAME: _____

AGE: _____

GANDER: _____

JOP: _____

Residency: _____

Symptoms:

	Present	Absent	
Nasal discharge			
watery			
mucoid			
mucopurulent			
bloody			
Sneezing			
Nasal obstruction			Rt Lt Bi
Itchy nose			
Hypo anosmia			
Snoring			
Chronic cough			
Constant desire to blow the nose or clear the throat			
Headache			

Duration: More than 4 days a week ☐ More than 4 weeks in a row ☐

Variation: seasonal ☐ perennial ☐

Cause: pollen ☐ animals ☐ dust ☐ infections ☐ unknown ☐

Does symptoms affect: Sleep ☐ Daily activities ☐ School or work ☐

System review ASTHMA CONJUNCTIVITIS SINUSITIS OM

Past medical & drug history: DM HTN Drug allergy

Past surgical history: YES NO if yes, what? _____

Family history of allergic rhinitis: YES NO if yes, who? _____

Social history: SMOKING ALCOHOL ANIMAL CONTACT CROWDING

Endoscopy finding:

	Present	Absent
Deviated nasal septum		
Abnormal middle turbinate		
Nasal polyps		
Mucopurulent discharge		
Inferior turbinate hypertrophy		
Abnormal uncinate process		
Post nasal space examination		

CT scan finding:

	Present	Absent
Retention cyst		
Turbinate hypertrophy		
Septal deviation		
Osteomeatal complex obstruction		
Infundibular occlusion		
Sinus thickening		
Sinus opacification		
Nasal polyposis		
Concha bullosa		

Results

1- Age distribution:

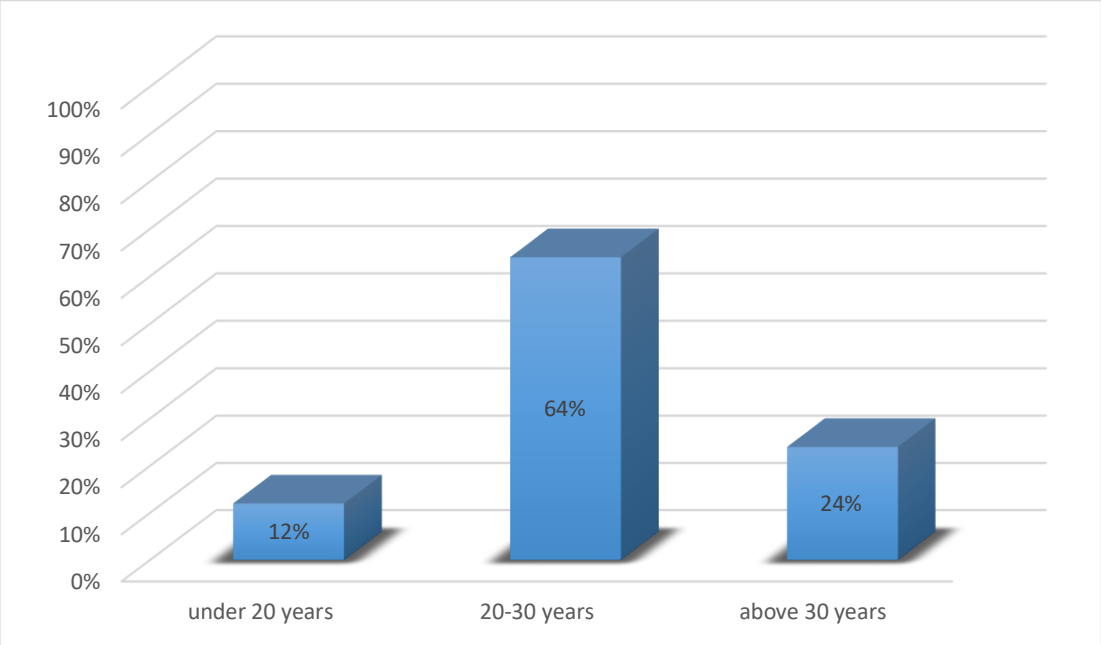

Chart 1: Age distribution in 50 case of chronic allergic rhinosinusitis

2- Gender distribution:

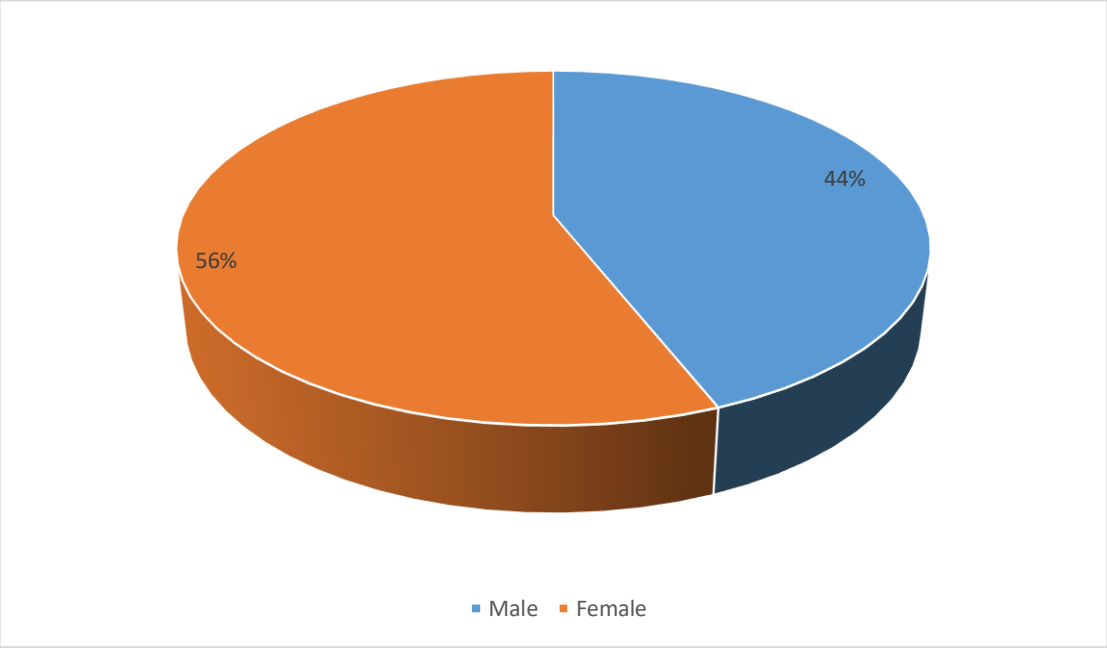

Chart 2: Gender distribution in 50 case of chronic allergic rhinosinusitis

3- Residency:

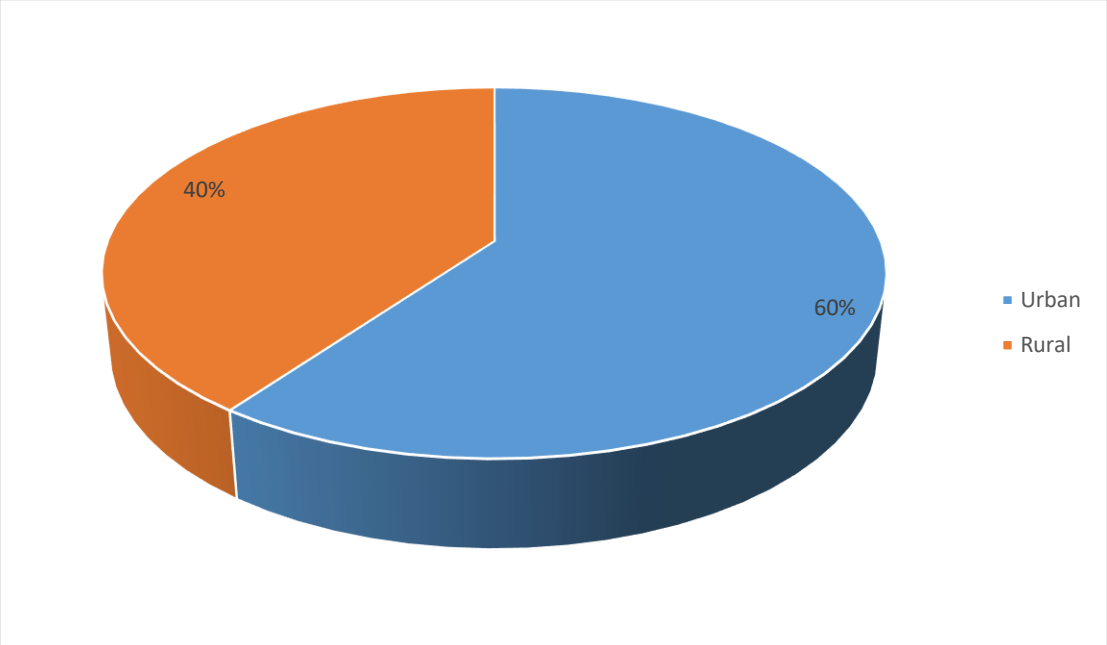

Chart 3: Residency in 50 case of chronic allergic rhinosinusitis

4- Symptoms:

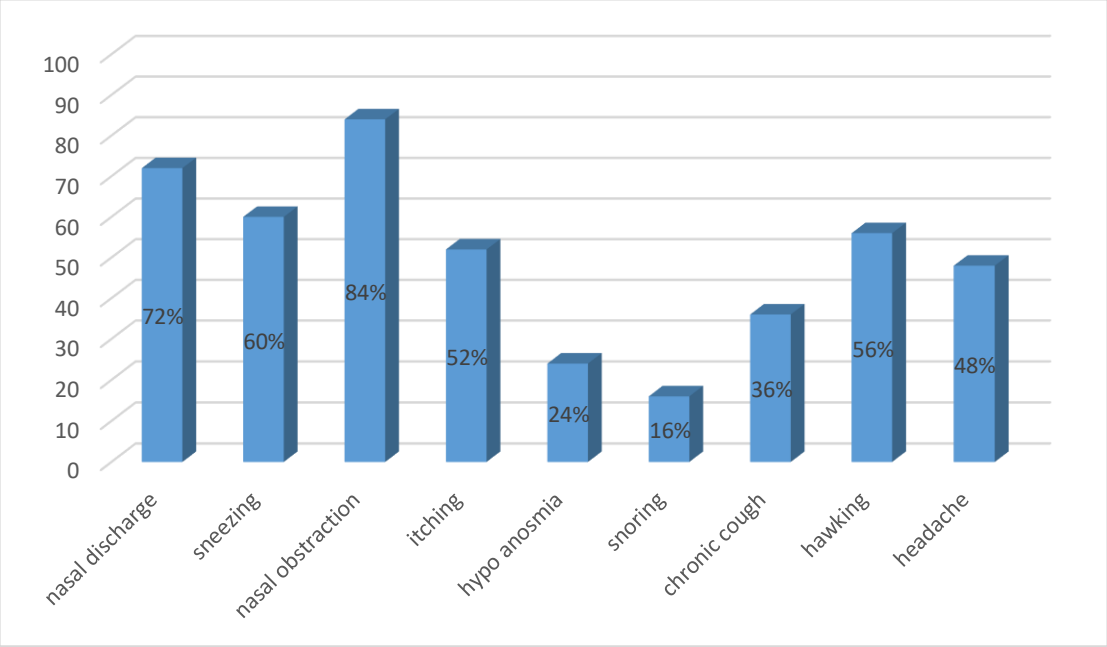

Chart 4: Symptoms in 50 case of chronic allergic rhinosinusitis

5- Variation:

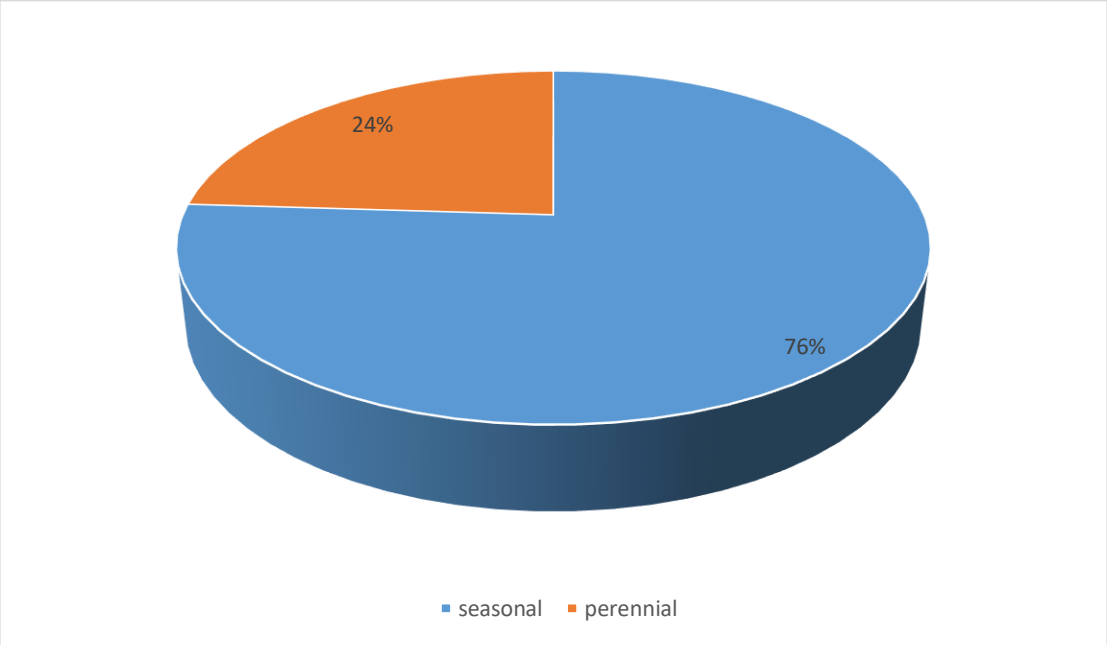

Chart 5: Variation in 50 case of chronic allergic rhinosinusitis

6- Causes:

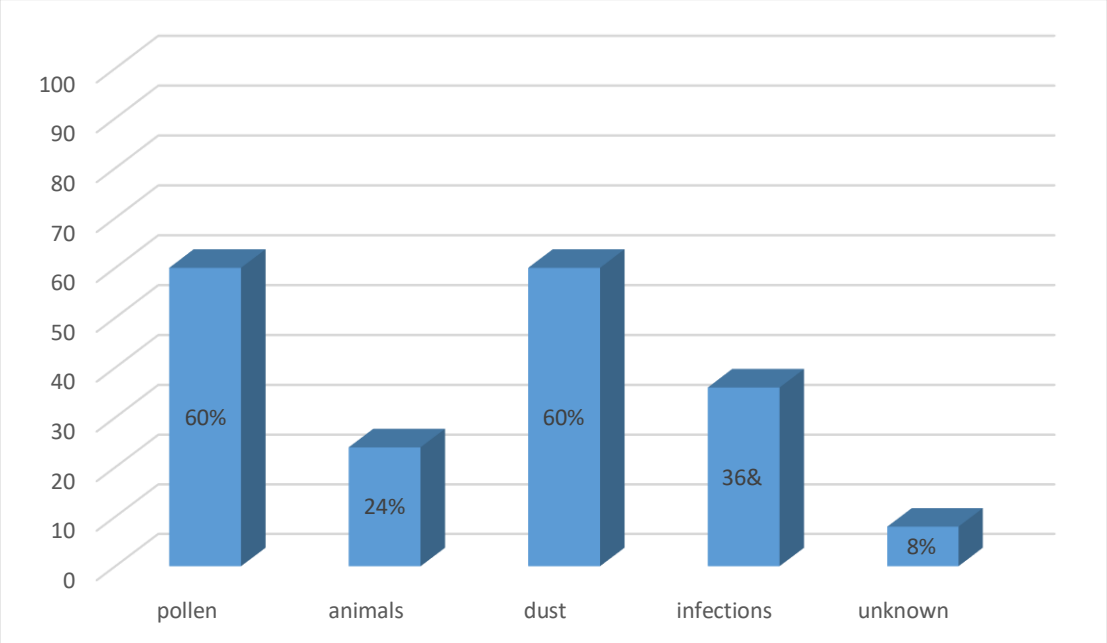

Chart 6: Causes in 50 case of chronic allergic rhinosinusitis

7- Severity:

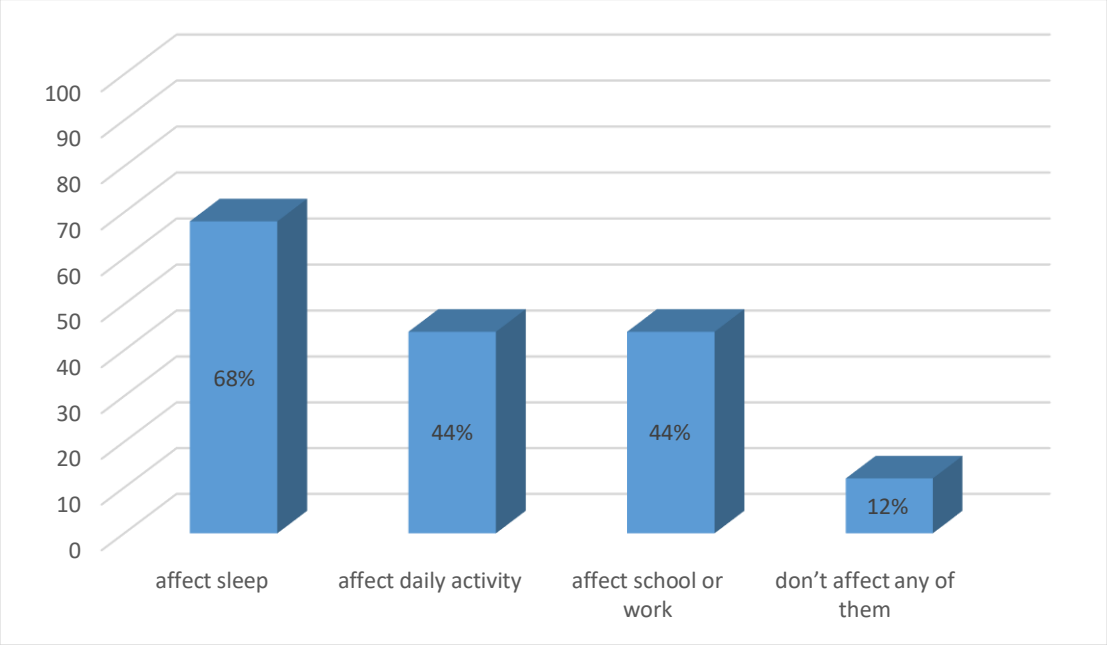

Chart 7: Severity in 50 case of chronic allergic rhinosinusitis

8- Other atopic disease:

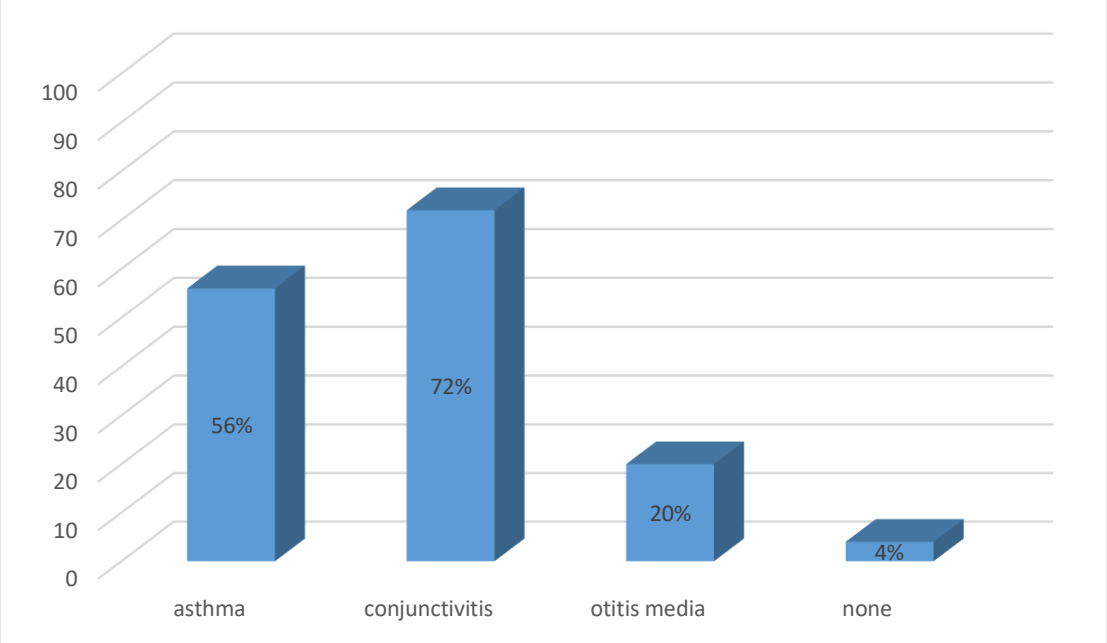

Chart 8: Atopic disease in 50 case of chronic allergic rhinosinusitis

9- Family history:

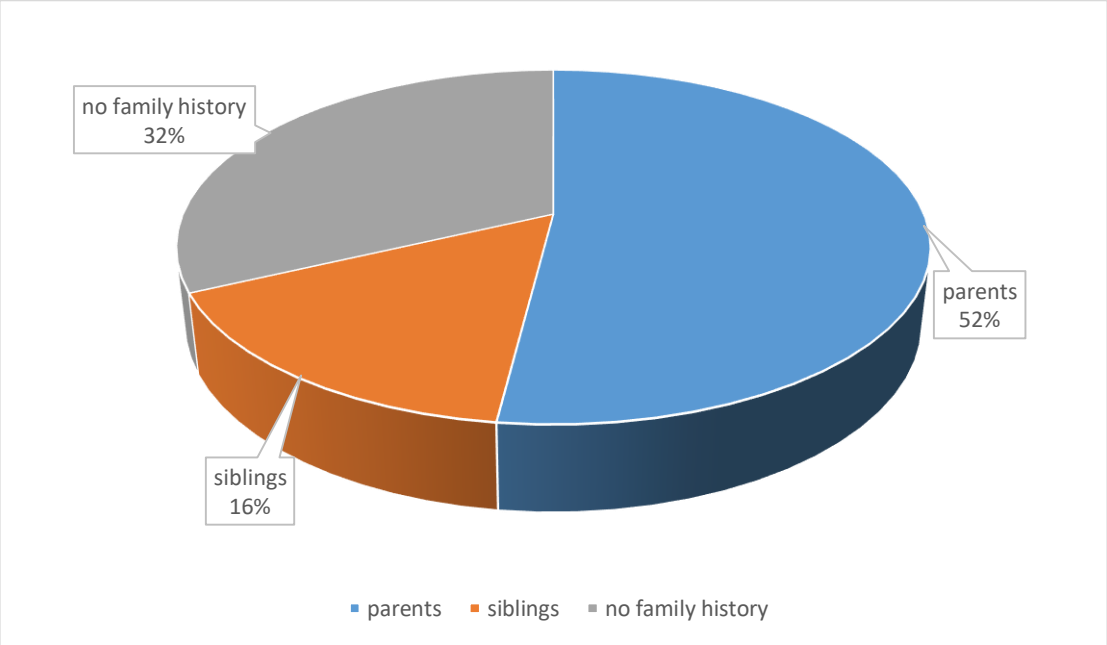

Chart 9: Family history in 50 case of chronic allergic rhinosinusitis

10- Social factors:

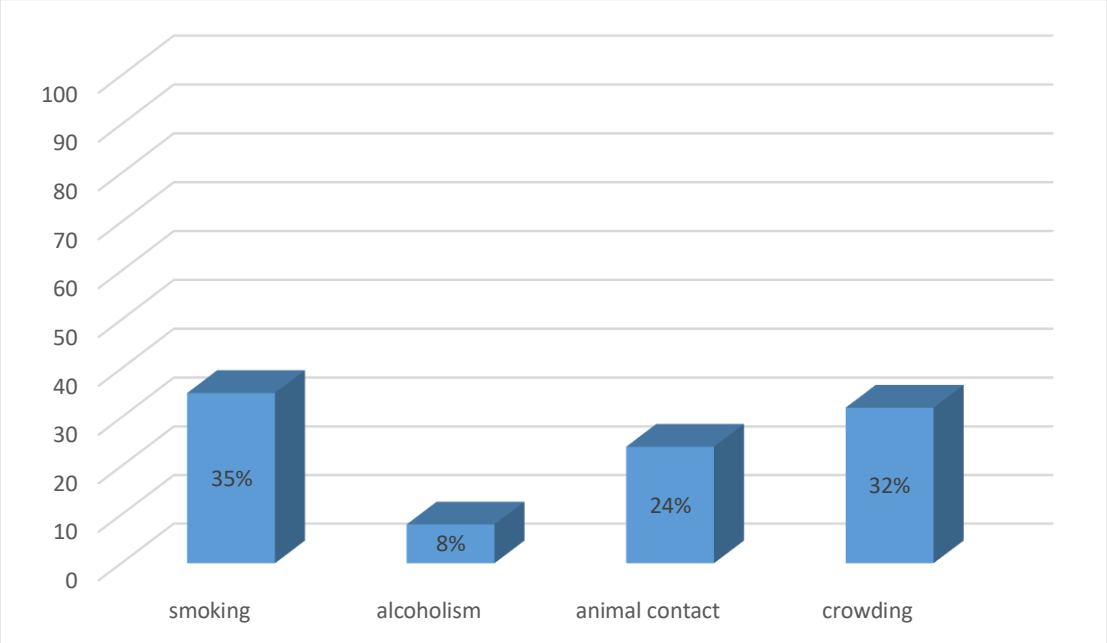

Chart 10: Social factors in 50 case of chronic allergic rhinosinusitis

11- Endoscopic finding:

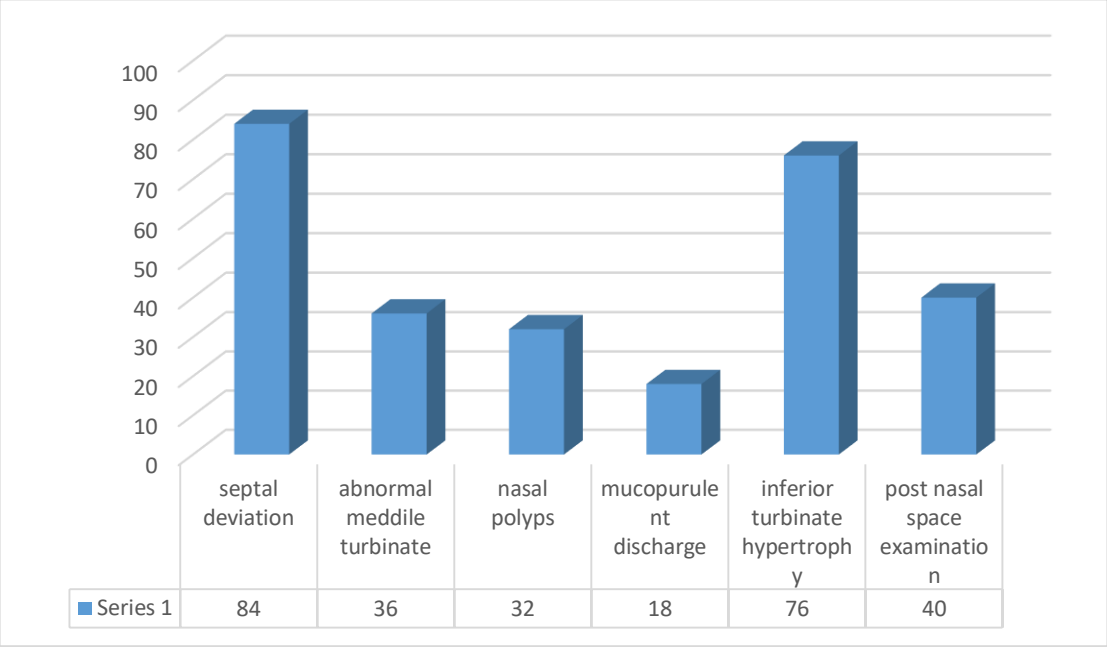

Chart 11: Endoscopy in 50 case of chronic allergic rhinosinusitis

12- CT scan finding:

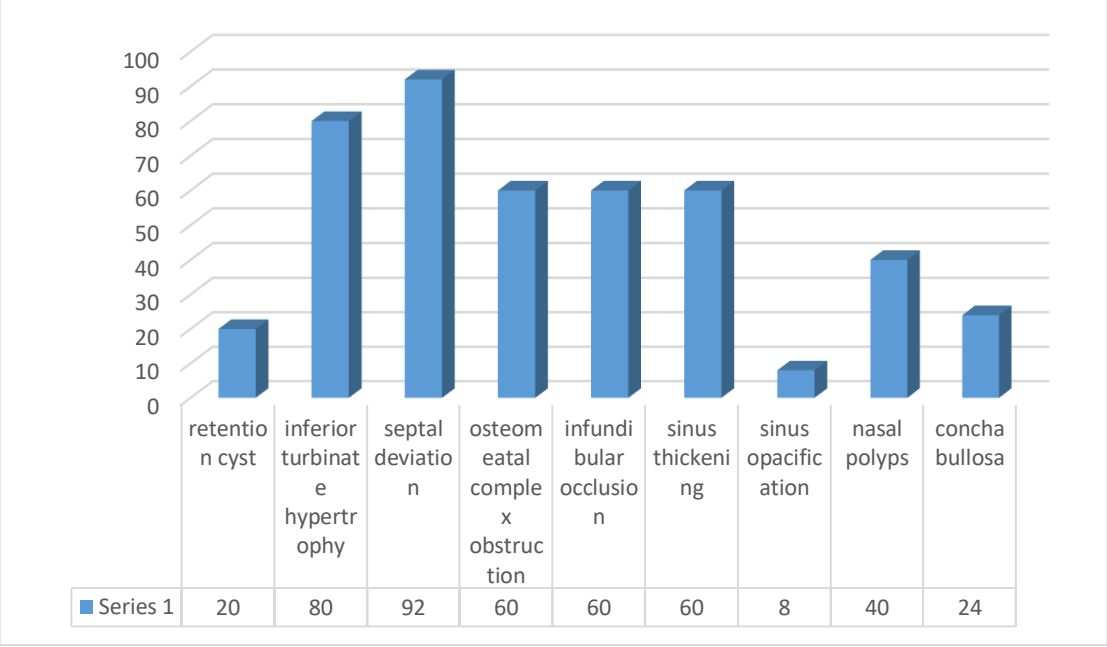

Chart 12: CT scan finding in 50 case of chronic allergic rhinosinusitis

feature	endoscopy	CT scan	p-value	Significance (p-value < 0.05)
septal deviation	84%	92%	0.08	not significant
inferior turbinate hypertrophy	76%	80%	0.5	not significant
nasal polyp	32%	40%	0.24	not significant

Table 2: Comparison between endoscopic & CT scan findings in 50 case of chronic allergic rhinosinusitis.

Discussion

Allergic rhinosinusitis is one of the most common allergic problems and its prevalence is increasing globally. The present population in our study (56% female and 44% male) was nearly similar to the previous study conducted by Shariat et al. in which 62% of the participants were female and 38% were male [(7)]. In a study by Hubert Chen et al., 37% of participants were female and 63% were male [(8)] which is inconsistent with the present study.

Previous studies have found that the prevalence of AR are low in the early teenage and peaks around the age of 16–24 and the reasons for the increasing prevalence of AR are "increased exposure to allergens, irritants and pollutants," [(9)] and the prevalence decreases in the subsequent years [(10, 11)]. This trend was confirmed by the present study. The age related decrease in the AR prevalence may be due to the allergen specific IgE level decrease that occurs with aging in atopic individuals [(12)].

Previous studies have found that the prevalence of AR is higher in urban than in rural areas [(13)]. In the current study, our results are consistent with previous studies that found a trend of increasing prevalence of chronic nasal symptoms with increasing degrees of urbanization [(14, 15)]. Factors related to geo-climatic variations, such as different lifestyles, diet and higher levels of allergen exposure may contribute to the regional differences in the prevalence of AR [(16)]. Several studies have established an association between increased air pollution and the increased risk of allergic sensitization and the prevalence of rhinitis worldwide [(17)], whereas other studies have failed to detect an association between air pollution and allergic sensitization or hay fever [(18, 19)] and it is possible that the lack of association between air pollution and reported symptoms is due to bias. However, a previous study carried out in Italy found that AR in residential areas was clearly associated with measured nitrogen dioxide level [(20)].

In our survey, the main symptoms were nasal blockage (84%) and rhinorrhea (72%). The other symptoms were hypo-anosmia, sneezing, itching, snoring, sleep problems, chronic cough and headache and this is similar to previous study in which Shariat et al. reported nasal congestion to be the most common symptom of the

disease and found a significant relationship between nasal congestion and quality of life impairment in patients [7] and also similar to other study [21] in which the symptoms more frequently complained about by AR patients were nasal blockage (94.23%) and rhinorrhea (90.38%). Other symptoms were hypo-anosmia (28.85%), snoring, sleep problems (17.31%), and chronic cough (13.46%) while in other studies conducted by Mohammadi et al. in Tehran, rhinorrhea was the most common (82%) symptom of allergic rhinitis [22]

In Previous studies intermittent allergic rhinitis was found to be the most frequent (68%) type of the disease in the study group and also in other study only (27%) of the participants mentioned that the symptoms persisted throughout the year. [21] and this is similar to our study in which intermittent type is (76%) of cases but this is differ from other study in which Shariat et al. reported the permanent type as the most frequent type (64%) [7] The disparity of the findings may be attributed to climate differences. For instance, in Tehran symptoms are permanent due to apartment living and air pollution, while in Sanandaj symptoms are intermittent or seasonal due to more open spaces, abundant trees and frequent winds in the region. This claim is supported by the fact that rhinorrhea (which is a symptom indicative of a seasonal allergy) was the most common symptom of allergic rhinitis in Sanandaj. However, nasal congestion was the most common symptom of the disease in the other study, which is indicative of a permanent allergy [23]

Aeroallergens are frequently implicated in AR [24]. They are usually classified as indoor (principally mites, pets, insects, outdoor (pollens and molds), or occupational agents. Classically, outdoor allergens appear to constitute a greater risk for seasonal rhinitis than indoor allergens [25], and indoor allergens pose a greater risk for perennial rhinitis [10, 26]. House dust mites comprise a large portion of house dust allergens and belong to the family Pyroglyphidae, subclass Acari, class Arachnida, phylum Arthropoda [27, 28]. Our survey results showed that the most common aero-allergens are pollen and dust (60%), infections (36%), and animal dander (24%) And this is similar to other study in which the most common aero-allergens are pollen and mites (67.31%), animal dander and pollutants (23.08%). [21]

The results of the present study showed, in the majority of patients, that their quality of life had been affected by problems caused by

allergic rhinitis, including general sleep problems and practical problems in school and work. In the studies conducted by Shariat et al. [7] Hubert Chen et al. [29] and Monico Mit et al. [30], more than 60% of the patients suffered from sleep problems and also problems when awake. In the present study, we found that patient quality of life was affected by severe sleep problems in 68% of the patients and this is similar to other study in which patient quality of life was affected by severe sleep problems in 62% of the patients. [31]

AR is an organ-specific manifestation of allergic disease. As such, it coexists with other organ-specific disorders that have a common allergic basis. Therefore, AR is rarely found in isolation but has been frequently associated with comorbid disorders [32]. In our study we can see that a majority of patients (96%) were found to have concomitant diseases, with the highest frequency pertaining to conjunctivitis (72%) and then asthma (56%). These findings are in accordance with the prior study by Shariat et al. which reported the prevalence of these two concomitant diseases with nearly similar frequency percentages [7] and also similar to other study in which the highest frequency pertaining to conjunctivitis (29%) and then asthma (12%). [31] Other study state that AR can easily induce medical complications, learning problems and sleep-related complaints, such as acute otitis media, serous otitis media [33] and this is proved by our study in which (20%) of patients also suffer from otitis media. But our study differ from other study in which the most common comorbidities of AR were asthma (78.85%) then conjunctivitis (40.38%). [21]

In our study the family history of a parent with AR is (52%) and the family history of a sibling with AR is (16%) and this is nearly similar to other study in which (58%) of patients have a parent with AR and (33%) have a sibling with AR and this data confirm the fact that, for some diseases, the genetic background plays crucial role and should be taken in to consideration [34]

The relationship between allergic sensitization and tobacco smoke exposure is complex. In our study 35 % of patients are smokers (all were males). One mechanism for the relation between rhinitis and smoking may be neurogenic inflammation induced by cigarette smoke. Neurogenic inflammation resulting from environmental exposures has been described in the literature and represents an inflammatory mechanism distinct from that of allergic sensitization

[35]. Population studies on the association between tobacco smoking and AR have provided inconsistent results, but a recent systematic review in adults found that active smoking was associated with a decreased risk of AR [36]. The apparent protective effect of cigarette smoking on AR might be due to the fact that AR is strongly associated to asthma (Chart 8), and therefore the affected subjects tend to avoid the irritant effect of smoking on their airways.

Nasal endoscopy was carried out in 50 patients with allergic rhinitis to evaluate endonasal anatomic variations. 96% of patients had abnormal endoscopic findings, i.e. deviated nasal septum (88%), abnormal middle turbinate (36%), nasal polyps (40%), mucopurulent discharge (18%), inferior turbinate hypertrophy (80%), and abnormal post nasal space examination (40%) and this is similar to other study [37] in which 95.2% of patients had abnormal endoscopic findings, i.e. deviated nasal septum (72.3%), abnormal middle turbinate (49.4%), nasal polyps (15.7%), mucopurulent discharge (14.5%), inferior turbinate hypertrophy (10.8%), abnormal uncinate process (9.6%), abnormal ethmoid bullae (7.2%), and enlargement of aggar nasi cells (2.4%).
In our study deviated nasal septum and inferior turbinate hypertrophy were the most common findings on pass I nasal endoscopic examination and this results agree with that done by Dr Sujeet Kumar., Dr Ramanuj Singh., Dr Manish Kr Singh., and Dr Subrata.Nag. [38]
These findings suggested that variations in endonasal anatomy was not by itself a pathology or a cause of symptoms. However, a combination of these variations may narrow the cleft of the ostiomeatal unit and cause contact area or stenosis, which predisposed patients to persistent symptoms, recurrent infection or resistance to therapy in patients with perennial allergic rhinitis. [39]
The findings show that septal deviation and the localized edema of turbinates, detected by the contact, was very frequent, mainly concerning the inferior turbinate (about 80% of patients). The multivariate analysis showed that the presence of turbinate's contact may be considered a reliable predictive factor for AR diagnosis. [39]

Ct scan was carried out in 50 patients with allergic rhinitis to evaluate sinonasal cavities. 96% of patients had abnormal

endoscopic findings, i.e. retention cyst (20%); inferior turbinate hypertrophy (80%); septal deviation (92%); osteomeatal complex obstruction (60%); infundibular occlusion (60%); sinus thickening (60%); sinus opacification (8%); nasal polyp (40%); and concha bullosa (24%). This results agree with study done by Mafee MF [40] which state that allergic rhinosinusitis is a clinical diagnosis, confirmed and staged with the CT scan of sinonasal cavities. Chronic inflammatory disease is often associated with mucosal thickening and sclerosis of the bone, particularly within the sinuses

According to (table 2) which compare between endoscopic & CT scan findings, the p-value was not significant. However, some pathological findings that had been shown on CT scan were not visible on endoscopy and vice versa, which mean that the two tools are completing each other's in the work up, and this result agree with other study [41] which state the severity and extent of sinus disease present on CT imaging helps guide decisions regarding medical and surgical treatment options.

Conclusions

- ✓ Allergic rhinosinusitis are slightly more in females.
- ✓ The peak of prevalence of Allergic rhinosinusitis is in the age of twenties.
- ✓ The prevalence of Allergic rhinosinusitis is higher in urban than in rural areas.
- ✓ The most common symptom of Allergic rhinosinusitis were nasal blockage while the less common symptom were snoring.
- ✓ Intermittent allergic rhinitis was found to be the most frequent type.
- ✓ The quality of life of the majority of patients had been affected by problems caused by allergic rhinitis, including general sleep problems and practical problems in school and work.
- ✓ The majority of patients were found to have concomitant diseases, with the highest frequency pertaining to conjunctivitis.
- ✓ Deviated nasal septum were the most common finding on nasal endoscopic examination while the less common finding were mucopurulent discharge.
- ✓ CT scan show that deviated nasal septum were the most common finding while sinus opacification were the less common finding.

Recommendation

AR is a very common disorder in childhood; however, the nasal symptoms are not pathognomonic, and it may be associated with other conditions, mainly infectious rhinosinusitis. Thus, the clinical picture may be complex and a differential diagnosis should be performed. Therefore, ENT specialists should frequently assess patients with suspected allergic rhinosinusitis by nasal endoscopy.

So ENT specialists should frequently assess patients with suspected allergic rhinosinusitis by nasal endoscopy.

Radiographic studies such as CT scan are not needed to establish the diagnosis of allergic rhinitis but they can be helpful for.

So CT scan is unnecessary as a routine examination. It should be reserved for evaluating possible structural abnormalities or to help detect complications or comorbid conditions, such as sinusitis or adenoid hypertrophy and for the pre-operative assessment of patients for endoscopic surgery, its main function being to show important anatomical landmarks; however, some pathological findings that had been shown on CT scan were not visible on endoscopy and vice versa, which mean that the two tools are completing each other's in the work up.

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