CORRELATION OF IMMUNOGLOBULIN (IGE) AND ABSOLUTE EOSINOPHIL COUNT (AEC) WITH DIAGNOSTIC NASAL ENDOSCOPY IN ALLERGIC RHINITIS PATIENTS

Dissertation submitted in partial fulfillment of the regulations for the award of the degree of

M.S DEGREE

BRANCH – IV (OTORHINOLARYNGOLOGY)

REG.NO: 220420508002

DEPARTMENT OF OTORHINOLARYNGOLOGY

VELAMMAL MEDICAL COLLEGE

MADURAI – 625 009

THE TAMILNADU

DR.M.G.R. MEDICAL UNIVERSITY

CHENNAI

MAY 2022

DEPARTMENT OF OTORHINOLARYNGOLOGY

VELAMMAL MEDICAL COLLEGE

MADURAI

CERTIFICATE

This is to certify that the dissertation entitled **"CORRELATION OF IMMUNOGLOBULIN (IGE) AND ABSOLUTE EOSINOPHIL COUNT (AEC) WITH DIAGNOSTIC NASAL ENDOSCOPY IN ALLERGIC RHINITIS PATIENTS"** is a bonafide original work of **Dr VIGNESH T,** with **REG.NO: 220420508002** submitted in partial fulfillment of the rules and regulations for the MS Branch IV, Otorhinolaryngology examination of The Tamil Nadu Dr. M.G.R Medical University to be held in May 2022.

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DECLARATION

I, **Dr VIGNESH T,** do hereby declare that the dissertation titled **"CORRELATION OF IMMUNOGLOBULIN (IGE) AND ABSOLUTE EOSINOPHIL COUNT (AEC) WITH DIAGNOSTIC NASAL ENDOSCOPY IN ALLERGIC RHINITIS PATIENTS"** submitted towards partial fulfillment of the requirements of the Tamil Nadu Dr. M.G.R. Medical University for the **MS Branch IV,** Otorhinolaryngology examination to be conducted in May 2022, is the bonafide work done by me, and due acknowledgements have been made in text to all materials.

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ACKNOWLEDGEMENT

I wish to express my heartfelt gratitude to my guide and mentor in ENT, **Dr Rajasekaran MS DLO,** Professor, Department of ENT, Velammal Medical College, Madurai for lending his wisdom, expert guidance and encouragement in conducting this study and preparing this dissertation.

I am grateful to my Associate Professor **Dr Maheshwaran MS DLO** and Assistant professors **Dr Rajavel MS DLO, Dr Pookamala MS DNB** and **Dr Vijay pradap** MS Department of ENT, Velammal Medical College, Madurai for their support and encouragement in carrying out this study.

I am thankful to our PG coordinator, **Dr Subbiah MS (Orthopaedics)** for conducting timely interim thesis update presentations which helped me to complete the project.

I am also extremely thankful to all my friends and colleagues, from the Department of ENT and the OPD and Ward nursing staff for helping me in collecting the cases and for their help in this study.

I would like to thank the Research Committee, VMCH & RI Hospital for granting me permission for conducting this study.

My special thanks to my family for their love, encouragement and constant support.

I am forever grateful to Lord Almighty for all the above mentioned people and for all the blessings that he has showered on me.

I am grateful to all the patients who participated in my study.

ETHICAL COMMITTEE CLEARANCE

Velammal Medical College Hospital & Research Institute

Velammal Village, Madurai - Tuticorin Ring Road, Anuppanadi, Madurai - 625009

Institutional Ethics Committee

IEC No: VMCIEC/31/2020 **Date: 24.11.2020**

To,
Dr Vignesh T, Postgraduate student
Department of Otorhinolaryngology
Velammal Medical College Hospital and Research Institute, Madurai

Subject: Approval of the study "Correlation of absolute eosinophil count and immunoglobulin E (IgE) with diagnostic nasal endoscopy in allergic rhinitis" by the Institutional Ethics Committee.

Dear Dr Vignesh T,

The Institutional Ethics Committee (IEC) of Velammal Medical College Hospital & Research Institute (VMCHRI), Madurai has reviewed and discussed your application to conduct the above mentioned study in the Department of Otorhinolaryngology with yourself as the Principal investigator.

The following documents have been submitted by you and reviewed by the members of the IEC:

No	Details of the Document
1	Cover letter to the IEC, dated 2.11.2020
2	Study proposal version NA dated 2.11.2020
3	ICF version NA dated 2.11.2020
4	ICF version NA dated 2.11.2020

The following members of the IEC were present at the meeting held on **10th November 2020**:

No.	Name	Designation	Gender	Role in IEC	*Attendance*	*Institutional Affiliation*	*Voted/ Not voted*
1	Dr BKC Mohan Prasad	Oncologist	Male	Chairperson	Yes	No	Voted
2	Dr Raj Kishore Mahato	Professor of Pharmacology	Male	Member-secretary	Yes	Yes	Voted
3	Dr Sasikala	Assistant Professor of Obstetrics & Gynae	Female	Clinician	Yes	Yes	Voted
4	Dr Trupti Bodhare	Professor of Community Medicine	Female	Basic Medical Scientist	Yes	Yes	Voted
5	Dr K Suganthy	Professor of Biochemistry	Female	Basic Medical Scientist	Yes	Yes	Voted
6	Mrs Usha Rani Patnaik	Retired Teacher	Female	Social Scientist	Yes	No	Voted
7	MrM Krishnamoorthy	Lawyer	Male	Lawyer	Yes	No	Voted
8	Mr M Murugesan	Asst. Prof. of English, MTN College,Madurai	Male	Layperson	Yes	No	Voted

It is understood that the study will be conducted under the supervision of Guide- Dr P Rajasekaran, Professor and Head, Department of Otorhinolaryngology as per the submitted protocol.

The following decision has been taken after deliberations:

- **We approve the study to be conducted in the current format.**

We declare that none of the members of the IEC who was involved in the decision making and voting procedure for this study had any conflict of interests with the study. We also declare that neither you nor any member involved in the above-mentioned study participated in the voting/ decision making process of the committee.

Please note that according to the 2017 ICMR guidelines, it is the responsibility of the principal investigator to report to the IEC any serious adverse event (SAE) occurring in the course of the study, **within 24 hours of its occurrence**, by letter and/or email. You are also expected to submit a detailed report of how the SAE was related to the research **within 14 calendar days of the occurrence of the SAE.**

You are expected to inform the IEC about the progress of the study, any revision in the protocol and patient information/informed consent as and when applicable. The IEC requires to be intimated after the completion of the study, in the attached format, and also to be provided with a copy of the final report of the study.

You should abide the rules and regulations of the institute and institutional ethics committee.

For studies which will continue more than a year, a continuing review report needs to be submitted (within one month of due date).

This IEC is working in accordance to ICH-GCP, ICMR guidelines, New Drugs and Clinical Trials Rules, 2019, and other applicable regulations.

Yours Sincerely,

24.11.2020

Dr. Raj Kishore Mahato
Member-secretary
Institutional Ethics Committee-BHR
VMCHRI, Madurai

MEMBER SECRETARY
Institutional Ethics Committee
Velammal Medical College Hospital
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Aneppanadi, Madurai-625 009

SCIENTIFIC COMMITTEE CLEARANCE

VELAMMAL MEDICAL COLLEGE HOSPITAL & RESEARCH INSTITUTE, MADURAI
RESEARCH AND DEVELOPMENT CENTER

SCIENTIFIC REVIEW COMMITTEE REPORT – PG DISSERTATION

Title of the Dissertation	"Correlation of Immunoglobulin E(IgE) and Absolute Eosinophil Count (AEC) with Diagnostic Nasal Endoscopy in Allergic Rhinitis patients"
Date of Presentation	29.01.2021
Name of Presenter	**DR.VIGNESH.T**
Name of Guide	Dr. P. RAJASEKARAN, Professor, HOD, Dept. of ENT
Department Submitted	ENT
Reference Number of the Project	025/RND/SC/21Dt:29.01.2021

S.NO.	CONTENT	YES / NO If No, give reasons
1.	Does the proposal have a suitable and a flexible title?	Yes
2.	Are the aims and objectives relevant to the title?	Yes
3.	Does the Scientific Content of the proposal suitable for the study in our institution?	Yes
4.	Are the Materials and Methods suggested for the study appropriate?	Yes
5.	Is the sample size suggested for the study sufficient?	Change the sample size formula in consultation with Statistician
6.	Does the project have relevant expected outcomes?	Yes
7.	Are suitable statistical analyses proposed for the study?	Yes
8.	Citing of appropriate References?	Yes
9.	Any Additional Techniques recommended for the study?	No
10.	Any Modification Suggested by the committee on the project?	Modify the inclusion criteria (IgE to be done for all allergic rhinitis patients)
11.	Any other additional comments	No

The above project proposal is **approved** by the Scientific Review Committee. **Ethical clearance already got.**

Dr.R.M.Rajamuthiah
Research &Development Incharge

*** (A project needs to have 7 or more conditions satisfied for approval)**

PLAGIARISM REPORT

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Document Information

Analyzed document	Allergic rhinitis plagiarism.docx (D123742645)
Submitted	2021-12-28T05:51:00.0000000
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Sources included in the report

W	URL: http://www.letpub.com.cn/index.php?page=internal-medicine&med_id=15662&class_id=9 Fetched: 2021-12-28T05:51:20.0070000	1
SA	**Tamil Nadu Dr. M.G.R. Medical University / PLAG FILE KINGSLY.docx** Document PLAG FILE KINGSLY.docx (D87734552) Submitted by: drkings669@gmail.com Receiver: drkings669.mgrmu@analysis.urkund.com	1
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SA	**Tamil Nadu Dr. M.G.R. Medical University / ANSHA THESIS.docx** Document ANSHA THESIS.docx (D57300053) Submitted by: anshaeldhose@gmail.com Receiver: anshaeldhose.mgrmu@analysis.urkund.com	1
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INTRODUCTION

Allergic rhinitis is an IgE-mediated allergic hypersensitivity disorder of the nasal mucous membrane that causes sneezing fits, itching in the nostril, thin watery postnasal drip, and the sensation of a blocked nose.[1] Around 20-30percent of the total of the Indian population suffers from nasal allergies, with 15% of those suffering from bronchial asthma.[2] Approximately one-fifth of patients who visit an ENT practitioner's outpatient clinic have allergy symptoms.[3]

Allergic rhinitis patients also experience sleep disturbances, fatigue, mood swings, and impaired higher brain processes, all of which negatively impact the patient's (QOL) quality of life and work productivity.[3] These patients may also have the following,

1) Allergic conjunctivitis,

2) Posterior nasal drip,

3) Otitis media with effusion,

4) Chronic rhino sinusitis, and

5) Malocclusion of teeth and facial deformities in the paediatric age range.

Household allergens such as dust mites, pets, cockroaches, and fungal moulds can cause an acute allergic reaction. Plant pollen, industrial allergens such as latex, cigarette smoke, vehicle exhaust, nitrogen oxide, and sulphur dioxide are examples of outdoor allergens. A detailed history should be followed by a clinical examination.

1) Anatomical changes,

2) Ethmoidal polypi,

3) Fungal elements, and

4) Nasal discharge should all be looked for during a nose and paranasal sinus examination.[4]

In different nations throughout the world, the International Study of Asthma and Allergies in Children (ISAAC) found that the prevalence of rhinitis with itchy watery eyes ranged from 0.8 to 14.9 percent in six to seven-year-olds and from 1.4 to 39.7 percent in 13-14-year-olds.[1] Allergic rhinitis can strike at any age, but it is most frequent during adolescence or early adulthood. Both Gender prevalence rates are comparable, and no racial or ethical differences have been identified. It has been discovered that children whose parents struggle from allergic rhinitis are more likely to develop allergies. If one parent has an allergy, the likelihood of a kid acquiring allergic rhinitis is 29%, and it rises to 47% if both parents have the condition.[5] Allergic rhinitis has a substantial impact on patients' social lives, as well as their academic achievement and work productivity. Allergic rhinitis is not a life-threatening condition. However, when allergic rhinitis is combined with otitis media, ET dysfunction, Chronic sinusitis, nasal polyps, allergic conjunctivitis, and atopic dermatitis, the morbidity is high. Sleep disturbances, learning difficulties, and weariness are all possible side effects. Anaphylaxis and Bronchial asthma have also been recorded as side effects.[1]

Allergen avoidance, medication, education, and perhaps immunotherapy are all used to treat allergic rhinitis. Surgery is only required in rare cases. Where the lower airway is also impacted, treatment strategies should include both the upper and lower airways. [6]

The nasal endoscopic examination appears to be useful for physicians since AR patients often have a series of alterations in nasal symptoms, such as pale and oedematous nasal mucosa, watery nasal discharge, and an enlarged inferior turbinate.[7,8] In addition, the modified Lund-Kennedy (MLK) scoring system, presented by Psaltis and Li et al., has been shown to be a more appropriate and reliable scoring method in rhinology outcomes study.[7,9,10]

Patients with allergic rhinitis undergo a series of basic tests, including a complete blood count with absolute eosinophil count, total serum IgE levels, nasal smear for eosinophilia, skin prink test, allergen specific estimation of IgE with RAST (Radio Allegro Sorbent test), ELISA (Enzyme Linked Immunosorbent Assay), and radiological investigations, such as a CT scan of the paranasal.[1]

In the pathophysiology of allergies, IgE plays a critical role.[11] It is the least abundant isotope of immunoglobulin, accounting for about 0.05 percent of total immunoglobulin concentration. IgE levels in atopic people, on the other hand, might rise by over 1000 times. The total serum IgE concentration rises in atopy. A newborn's IgE level is approximately 0.22 IU/ml. By the time an atopic person reaches the age of 15, their total serum IgE levels will have reached adult levels, and after the seventh decade, the number of identifiable allergens will have decreased, resulting in a gradual decline in total serum IgE levels.[12] In a non-allergic person, normal blood IgE levels can reach 120 IU/ml. 3 Dietary factors, genetics, demographics, and lifestyle choices all have an impact on serum IgE levels. In a peripheral smear, the typical range of eosinophils is 0-6 percent, whereas the absolute eosinophil count is 40 to 440 cells/cumm.[13]

The aim of the present study is to estimate the total serum IgE levels, and absolute eosinophil counts in allergic rhinitis patients and also to correlate the level of Immunoglobulin E and Absolute Eosinophil Count with Diagnostic Nasal Endoscopy in Allergic Rhinitis patients.

OBJECTIVES

1. To estimate the Serum Total IgE level in patients with Allergic Rhinitis
2. To estimate the Absolute Eosinophil Count (AEC) in patients with Allergic Rhinitis.
3. To Correlate Serum Total Immunoglobulin E Level and Absolute Eosinophil Count (AEC) with Diagnostic Nasal Endoscopic Findings in Allergic rhinitis patients

REVIEW OF LITERATURE

NASAL ANATOMY

Except for the nasal vestibule, the most distal section of the nasal cavity, which is lined by stratified squamous epithelium, the nasal cavity is bordered by pseudostratified columnar epithelium. Each nasal cavity's inferior, middle, and superior turbinates regulate temperature, filter, and humidify inspired air. Changes in blood supply can cause blockage in the nasal mucosa, which is very vascular. The autonomic nervous system has an impact on the nasal mucosal vasculature. Vasoconstriction and a decrease in nasal cavity resistance result from sympathetic activation. The opposite impact of parasympathetic stimulation is an increase in nasal gland production and nasal cavity resistance. The noradrenergic noncholinergic system is also found in the nasal mucosa, however the role of neuropeptides like substance P in clinical symptoms is unknown.[14]

Introduction

Allergies such as asthma, rhinitis, anaphylaxis, food, drug, and insect allergies are becoming more common around the world.[15] Allergy rhinitis is one of the most common allergic illnesses in the world, affecting around 10% to 25% of the population. One of the top ten reasons for seeing a primary care physician is for this reason.[16]

Allergic rhinitis burden

Allergic rhinitis is a huge problem, accounting for around 55% of all allergies.[17] Approximately 20-30% of the Indian population has at least one allergy condition.[17] In India, the prevalence of allergic rhinitis is estimated to be between 20% and 30%.[2] According to studies, the prevalence of allergic rhinitis has been rising in India in recent years. According to the International study of asthma and allergies in childhood (ISSAC) phase 1 (1998), nasal

symptoms were present in 12.5 percent of children aged 6-7 years and 18.6 percent of children aged 13-14 years in India, while allergic rhino-conjunctivitis was seen in 3.3 percent and 5.6 percent of children aged 13-14 years.

The frequency of nasal symptoms grew to 12.9 percent and 23.6 percent in the 6-7- and 13-14-year age groups, respectively, in the ISSAC phase 3 (2009) study, whereas allergic rhino-conjunctivitis climbed to 3.9 and 10.4 percent.

A study from Mysore, which was recently published, found similar results. Between 1998 and 2013, there has been a constant upward trend of allergic rhinitis in children (6-14 years old).

Pathophysiology of Allergic Rhinitis

Allergic rhinitis is IgE –mediated or a type I, immediate[18] response to the protein or glycoprotein component of inhaled aeroallergens[19] including

1) Pollens,

2) Molds,

3) Animal danders,

4) Dust-mite fecal particles, and

5) Cockroach residues.[20]

Small molecular weight compounds can behave as haptens in the workplace, combining with self-proteins to produce full allergens.[21] The allergen settles in the nasal mucus after intake. Antigen-presenting cells in the nasal epithelial mucosa induce apoptosis and process the allergen once it has been deposited, and then present the processed antigen to CD4+ T lymphocytes in the nearby lymph nodes. T cells activated by allergens proliferate in a Th2 pathway, producing cytokines such as IL-3, IL-4, IL-5, IL-13, and others. Plasma cells produce IgE antibodies both locally and systemically as a result of these cytokines. Mast cells and

basophils bind to these antibodies. Sensitization is the term for this procedure. IgE antibodies, which are linked to mast cells and basophils, detect the allergen after reexposure. Mast cells and basophils degranulate as a result of the recognition and subsequent binding, releasing prepared mediators such as histamine and enzymes like tryptase and chymase. Other mediators, such as cysteinyl leukotrienes (leukotriene D4) and prostaglandin D2, are also synthesised rapidly from scratch (PGD2).

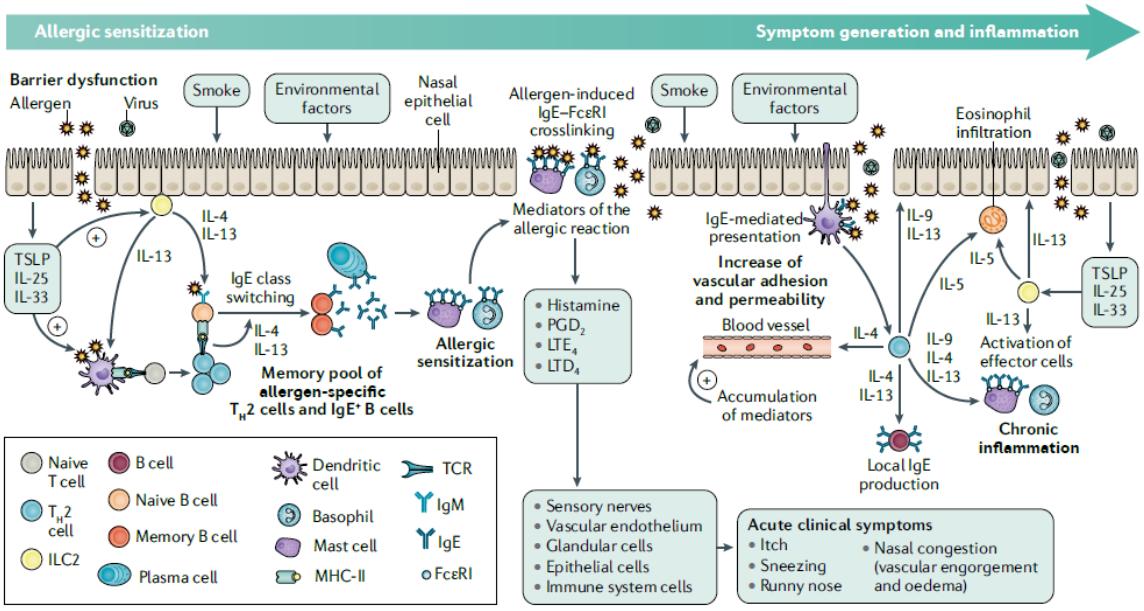


Figure 1: Pathophysiology of Allergic Rhinitis[22]

The mediators cause arteriolar venous junction vasodilation, plasma leaking from vascular system, increased mucous production, and afferent nerve stimulation, resulting in nasal channel obstruction. Pruritus, rhinorrhoea, and sneezing are caused by histamine, while leukotrienes and PGD2 are linked to the formation of nasal congestion. This refers to the initial or quick response.

The late-phase reaction is mediated by cytokines generated during the immediate-phase response, which mediates a cascade of events over the next 4–8 hours. Early and late reaction clinical signs are similar, however nasal symptoms predominate in the late phase. During the early phase of the response, mediators released by postcapillary endothelial cells promote the

expression of adhesion molecules that aid in the migration of eosinophils, neutrophils, and basophils, as well as macrophages and CD4_ Th2 cells, into the superficial lamina propria of the nasal cavity. Except for mast cell–derived tryptase, chymase, and PGD2, these cells become activated and produce additional mediators similar to those engaged in the early response phase.[23]

The nasal mucosa gets increasingly sensitive with repeated exposure to an allergen, and the amount of allergen necessary to elicit symptoms decreases over time, a phenomenon known as priming. Furthermore, the priming effect may increase nasal mucosa sensitivity to nonallergic triggers like cigarette smoke and strong scents.

Classification

Allergic rhinitis is classified as intermittent or chronic according to the Allergic Rhinitis and Its Impact on Asthma (ARIA) standards. The disease is defined as intermittent if one or more of the symptoms of rhinitis, such as nasal irritation, rhinorrhea, sneezing, and congestion, are present for four days of the week or for four weeks in a row. Persistent disease is defined as having symptoms for more than four days of the week and for more than four weeks. Based on the severity of the symptoms and quality-of-life results, intermittent and persistent rhinitis is further classified as mild, moderate, or severe illness. Mild rhinitis is defined as no sleep disturbance, no impairment of everyday activities, leisure, and/or sports, no impairment of school or work, and no bothersome symptoms. If one or more of the aforementioned symptoms are present, the condition is classed as moderate/severe.[14] The ARIA classification has gradually replaced the categorization of allergic rhinitis as seasonal for those who experience symptoms only during specific pollen (tree, grass, and weed) or mould seasons, or perennial for those who experience symptoms year-round, typically due to pet dander, house dust mites, cockroaches, and mould in some climates.

Rhinitis subtypes

The first element in rhinitis therapy is establishing which type(s) of rhinitis an individual has, which can be difficult due to the many phenotypes and endotypes of rhinitis. Clinical manifestations defines a phenotype, whereas the underlying pathophysiologic mechanism defines an endotype. The presence of positive allergy skin testing or serum-specific IgE testing distinguishes AR from NAR. Local AR (LAR), which is often diagnosed in persons with negative serum and skin sensitivity tests but histories indicative of AR, is diagnosed through some kind of positive nasal allergen challenge or the discovery of specific IgE (sIgE) in nasal secretions, or perhaps both, as explained below.[24]

1) Infectious,

2) Drug-induced,

3) Gustatory,

4) Hormone-induced,

5) Atrophic,

6) Senile, and

7) Idiopathic rhinitis are some of the subtypes of NAR (IR).[25]

Nasal symptoms can also be caused by structural or mechanical problems like choanal atresia, adenoidal hypertrophy, septal deviation, nasal tumours, or cerebrospinal fluid leaks, as well as systemic diseases like cystic fibrosis, primary ciliary dyskinesia, eosinophilic granulomatosis and polyangiitis, sarcoidosis, and amyloidosis. Occupational rhinitis, which can be allergic or nonallergic, has a variety of causes and can manifest itself either immediately after starting a new job with a new antigenic exposure or after a latency period, during which

an individual is building sensitization to the new antigen. Patients frequently have many types of rhinitis, resulting in a heterogeneous phenotype, endotype, or both.[24,26]

Risk factors

1) Pollens (tree, grass, and weed pollens, including ragweed),

2) Moulds, and

3) Indoor allergens (house dust mites and animal allergies) are all linked to AR, and there is a lot of variation within and between nations.[27]

1) IgE (vegetable and animal proteins, as well as some chemicals) and

2) Non-IgE (isocyanates, persulfate salts, and forests) pathways are both involved in occupational AR.[28]

1) Antibiotic use,

2) Self-reported air pollution,

3) Farm animal exposure (only in LMICs),

4) Exposure to cats and/or dogs,

5) Maternal and paternal smoking, and

6) Strenuous physical activity in teenagers are all risk factors for AR.[29]

Most of these risk variables are also found in people with asthma and atopic dermatitis.[29] Obesity and being overweight are not linked to AR.[30] It's worth noting that several of these exposures and lifestyle risk factors haven't been proven to be important AR risk factors;[31] Ambient air pollution and passive smoking, for example, do not appear to have a

significant impact on the development of AR, but pollution may be linked to higher AR severity.[32]

Atopy is responsible for 50% of all rhinitis cases in the general population.[33] Because of a similar genetic origin, AR, asthma, and atopic dermatitis frequently coexist in the same person.[34,35] Indeed, evidence from genome-wide association studies (GWAS) have shown that allergic diseases and traits express a huge number of genetic susceptibility loci, with

1) IL33,

2) IL1RL1 (also known as IL33R),

3) IL13–RAD50,

4) C11orf30 (also known as EMSY)–LRRC32, and

5) TSLP appearing to be important for multimorbid allergic diseases.[31,36]

Furthermore, rhinitis was linked to TLR expression, whereas AR linked to asthma was linked to IL5 and IL33, implying that AR alone has a distinct genetic origin than multimorbid AR.[37] The use of transcriptome signatures as markers for solitary and multimorbid allergic disorders requires more research.

Susceptibility loci for AR have various immune functions, such as

1) inflammatory adhesion for MRPL4 (19q13),

2) activation, development, and maturation of B cells,

3) epithelial barrier function/ regulatory T cell function for BCAP (also known as PIK3AP1; 10q24), and

4) immune tolerance for C11orf30–LRRC32 (11q13), whereas others have unknown functions, such as FERD3L. (7p21).[36]

Furthermore, data from a large GWAS and HLA fine-mapping investigation identified 20 novel loci linked to AR, several of which exhibited immunological activities related to both innate and adaptive IgE-related pathways.[38] The estimated prevalence of AR attributed to the major found AR-associated loci was 39 percent in that study, which is a high estimate for a complicated disease. In other GWAS studies, common genetic pathways in AR and non-allergic rhinitis have been discovered.[35,38,39]

Symptoms of allergic rhinitis

Due to their distinctive clinical profile and necessity for a different therapeutic strategy, allergic rhinitis is often categorised as sneezing runners and blocks. Sneezing, anterior rhinorrhoea, and itchy nose and eyes are the most common symptoms in people who are primarily sneezers and runners. On the other hand, nasal congestion is the most common symptom of blockers, and nasal blockage and thick mucus can cause post-nasal drip and dyspnea.[16] Deb and colleagues evaluated 548 Indian adults with allergic rhinitis and discovered that the number of blockers is much greater than the proportion of sneeze runners in a recent study. According to the ARIA guidelines, the most common type of allergic rhinitis was moderate to severe persistent allergic rhinitis, which affected about one-third of patients. Similarly, nasal blockage was the most prevalent symptom in a questionnaire-based survey of 2300 school students aged 4 to 18 years in Jaipur. Figure 6 depicts the most typical symptoms of allergic rhinitis. 35.6 percent of children with allergic rhinitis reported sporadic symptoms, whereas 64.3 percent had persistent symptoms.[40]

The impact of climate change on allergic rhinitis

Climate change's possible impact on the intensity and spread of AR has been studied extensively, most notably in the case of ragweed pollen.[41–43] Pollen output from individual plants has been proven to increase when temperature and carbon dioxide exposure rise.[41] At the very same time, a rise in the number of frost-free days and a later first frost have been linked to longer ragweed pollen seasons, suggesting that ragweed will be able to spread further north.[42] Ragweed has established itself in the Rhone Valley/Burgundy region of France, northern Italy, Hungary, and neighbouring countries, which is of particular concern.[43] It is so prepared to expand into Poland, Germany, and northern France, given appropriate climatic circumstances.[43]

Common Allergens

Exposed to permanent or seasonal allergens found in the indoor and outdoor areas, the most common of which are pollens (grass, trees, weeds), house dust mites, pets, and moulds, is a common cause of allergic rhinitis.[44] Deb et al. discovered that blockers were more sensitive to polyvalent house dust, house dust mites, and fungi, while sneezers-runners were more sensitive to pollens.[16]

Common comorbidities in Allergic Rhinitis

Asthma, sinusitis, otitis media, atopic dermatitis, and nasal polyps are among the comorbid disorders linked with allergic rhinitis.[45] Asthma was the most frequent concomitant condition in Deb et al's study, with nearly half of patients having it.[16] The majority of children with allergic rhinitis (58.1%) had one or more comorbidities, while 22% of children had two or more comorbidities.[46] There were no comorbid conditions in 41.9 percent of the people.

Quality of Life in Allergic Rhinitis

Despite the fact that allergic rhinitis has a negative impact on quality of life, it is commonly dismissed in India as a minor illness, and patients fail to ascribe their symptoms to allergic rhinitis. Allergic rhinitis degrades one's quality of life. Allergic rhinitis can have a negative impact on one's physical, psychological, and social well-being, as well as their ability to work. A study of 34 Indian patients with allergic rhinitis found that the condition had a negative impact on the patients' behaviour, work performance, and lifestyle. Furthermore, allergic rhinitis made it difficult to work because of the need to blow one's nose frequently and rub one's eyes and nose.[47]

Diagnosis

The diagnosis of allergic rhinitis is frequently determined clinically based on the presence of specific symptoms and a positive response to antihistamines or nasal steroid treatment. The presence of allergen-specific IgE in the blood or positive epicutaneous skin tests (i.e., wheal and flare reactions to allergen extracts) and a history of symptoms that match with exposure to the sensitising allergen are used to make a formal diagnosis. When seasonal symptoms are present or the patient can clearly identify a single trigger, it is easier to diagnose the disease than when symptoms are persistent or the patient reports multiple triggers, such as allergens and irritants. The sensitivity of epicutaneous skin testing and allergen-specific IgE testing is similar, though they do not detect sensitization in a totally overlapping set of patients.[48] Blood testing has the advantage of not requiring the patient to stop taking antihistamines many days ahead of time, and it does not require technical skills to execute the test, but skin testing has the advantage of providing quick findings. To interpret the findings of any test, you'll need to be familiar with the allergens that are prevalent in your area, as well as their seasonal patterns.[49]

Nonallergic rhinitis, such as noninflammatory rhinopathy (also known as vasomotor rhinitis) and nonallergic chronic rhinosinusitis, are included in the differential diagnosis.[50] Only about one in 4 to 5 patients with rhinitis obtains a diagnosis of nonallergic rhinitis in allergy health centers, but this assumption is skewed by the nature of referrals to such clinics; in the general public, the prevalence of nonallergic rhinitis is higher, possibly approaching 50% of all rhinitis cases.[51] More than 50 % of patients diagnosed as having nonallergic rhinitis on the grounds of negative serum IgE or skin testing may have "local allergic rhinitis" related to production of allergen-specific IgE antibodies limited to the mucosa, according to some studies using nasal allergen-provocation testing as the diagnostic standard, but this observation requires further study, and the measurement of allergen-specific IgE in nasal fluid is restricted to research.[52]

Viral infections can create seasonal symptoms, especially when the patient is a child or lives alongside children; rhinovirus has a high incidence peak in September and a lower incidence peak in the spring.[53] Although allergic and nonallergic rhinitis can coexist (mixed rhinitis), nasal sensitivity to nonspecific stimuli can be experimentally induced in people with allergic rhinitis, suggesting that the "nonallergic" component may simply represent a state of nasal hyperresponsiveness rather than the coexistence of two distinct entities.[54]

The Role of Nasal Endoscopy in Allergic Rhinitis

The expansion of outcomes research in rhinology has been fueled by the conception of evidence-based medicine in the 1990s. The capacity to precisely capture a patient's response to a given intervention in a uniform manner is critical to this research. There are a variety of measures available for evaluating patient-reported outcomes. Only sinonasal symptoms are measured in one category of questionnaire. This includes the

1) visual analogue scale (VAS) for scoring symptoms[55],

2) the Sinus Symptom Questionnaire (SSQ),[10] and

3) the Nasal Obstruction Symptom Evaluation Scale.[56]

Other category takes into account both sinonasal symptoms and overall quality-of-life factors. These include,

1) the Sino-Nasal Outcome Test-22 (SNOT-22),[57]

2) the Chronic Sinusitis Survey,[58] and

3) Rhinosinusitis Disability Index (RSDI).[59]

These patient-reported outcome measures (PROMs) have a high level of reliability and internal validity, which has led to their extensive usage in clinical rhinologic research.

Table 1: Lund-Kennedy endoscopic scoring system[60]

Polyp	0 - no polyps
	1 - polyps in middle meatus only
	2 - beyond middle meatus
Oedema	0 - absent
	1 – Mild
	2 – Severe
Discharge	0 - no discharge
	1 - clear, thin discharge
	2 - thick, purulent discharge

Scarring	0 - absent
	1 – Mild
	2 – Severe
Crusting	0 - absent
	1 – Mild
	2 – Severe

Table 2: Perioperative sinus endoscopy scoring system[61]

Middle turbinate	Normal = 0
	Synechia/lateralized = 1–2
Middle meatus/MMA	Healthy = 0
	Narrowing/closure = 1–2
	Maxillary sinus contents = 1–2
Ethmoid cavity	Healthy = 0
	Crusting = 1–2
	Mucosal oedema = 1–2
	Polypoid change = 1–2
	Polyposis = 1–2
	Secretions = 1–2
Frontal recess/sinus	0 – 2
Sphenoid sinus	0 – 2

Overall total	16 = middle meatal antrostomy + ethmoidectomy
	18F = middle meatal antrostomy+ ethmoidectomy + frontal sinusotomy
	18S = middle meatal antrostomy + ethmoidectomy + sphenoidotomy
	20 = middle meatal antrostomy + ethmoidectomy + sphenoidotomy + frontal sinusotomy

Radiologic and endoscopic scoring systems have been the primary focus of outcomes research among objective markers of disease burden. Endoscopic scoring systems have undergone less scrutiny than radiologic scoring systems, which have been thoroughly contrasted and validated.[9]

The Lund-Kennedy (LK) endoscopic scoring system was created in 1995 by Lund and Kennedy, who headed the Staging and Therapy Group for Chronic Rhinosinusitis. It is based on the degree of scarring, crusting, edoema, polyps, and discharge.[60] The LK method is still the most widely used and cited endoscopic grading system in rhinology outcomes research. Despite its widespread use, the LK system has yet to be confirmed, and it has been shown to have weak correlation with PROMs.[62]

The LK system was also created to describe endoscopic findings in individuals who had previously had endoscopic sinus surgery. With scarring and crusting accounting for 40% of the LK total score (items of primary postoperative concern), some have speculated that the LK system's poor correlations with other outcomes measures may be due in part to its misuse in unoperated patients.

Wright and Agrawal developed the Perioperative Sinus Endoscopic (POSE) scoring system in 2007 as part of an experiment evaluating the impact of perioperative systemic

steroids on postsurgical outcomes in chronic rhinosinusitis (CRS) patients, in an attempt to improve upon the LK system and other existing endoscopic scoring systems.[61] Durr et al. established the Discharge, Inflammation, Polyp (DIP) scoring system, which assesses discharge, inflammation, and polyps, more recently.[63]

Table 3: Discharge, inflammation, and polyps/ oedema scoring system[63]

Discharge	0 = absent discharge
	5 = thick mucus
	10 = purulent discharge.
Inflammation	0 = no inflammation
	5 = moderate inflammation
	10 = severe inflammation
Polyps/ oedema	0 = normal mucosa
	5 = marked oedema/ no polyps
	10 = polyps filling nasal cavity

Table 4: Modified Lund-Kennedy scoring system[60]

Polyps	0 = no polyps
	1 = polyps in middle meatus only
	2 = beyond middle meatus
Oedema	0 = absent
	1 = mild
	2 = severe
Discharge	0 = no discharge
	1 = clear, thin discharge
	2 = thick, purulent discharge

The Immunoglobulin E Molecule

The IgE molecule is one of five immunoglobulins found in the humoral immune system discovered by Ishizaka and Ishizaka in 1967.[64] IgE has a heterotetramer structure with two heavy and two light chains with variable and constant sections, similar to other types of antibodies, but still it differs in the sequencing of -heavy chain constant portions. In contrast to IgG, which has three heavy chains, IgE has four (C1– C4) heavy-chain constant domains.[65] When compared to the other types of immunoglobulins, IgE has the lowest plasma levels. The plasma level of IgE in nonallergic persons is 10,000- to 50,000-fold lower than that of plasma IgG (IgE, 50–300 ng/mL versus IgG, 10 mg/mL).[66,67] Half of the IgE molecules are linked to cells in the tissues (respiratory mucosa, gastrointestinal tract, and skin), which accounts for its key role in acute anaphylactic reactions and allergic inflammation.

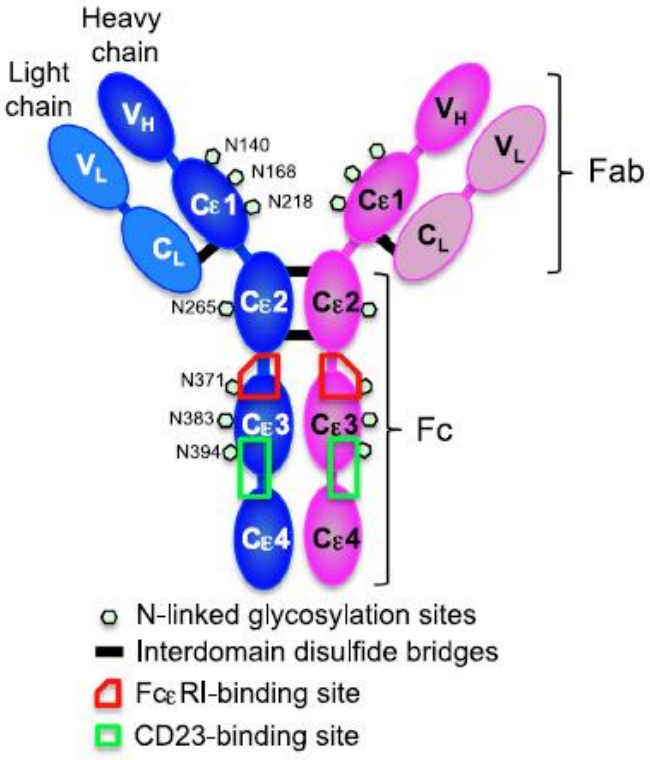


Figure 2: Immunoglobulin E (IgE)- Structure[68]

It's been more than 30 years since immunoglobulin E (IgE) was identified as the key molecule in mediating what are now known as type 1 hypersensitivity reactions, and nearly a century since the first suggestion that a soluble factor in plasma or serum might be responsible for the symptoms of allergic disease and asthma (allergic asthma, allergic rhinitis, food allergy, atopic dermatitis, some forms of drug allergy, and insect sting allergy). Many elements of the inflammatory cascade that underpins allergy and asthma have been explained since then, and IgE is now recognised as a critical upstream player. The objectives of this study are to explore the evidence for IgE's involvement in both the immediate allergic response and the late-phase or chronic inflammatory response in the skin and lungs, as well as to review the cellular and molecular events set in motion by IgE.[69]

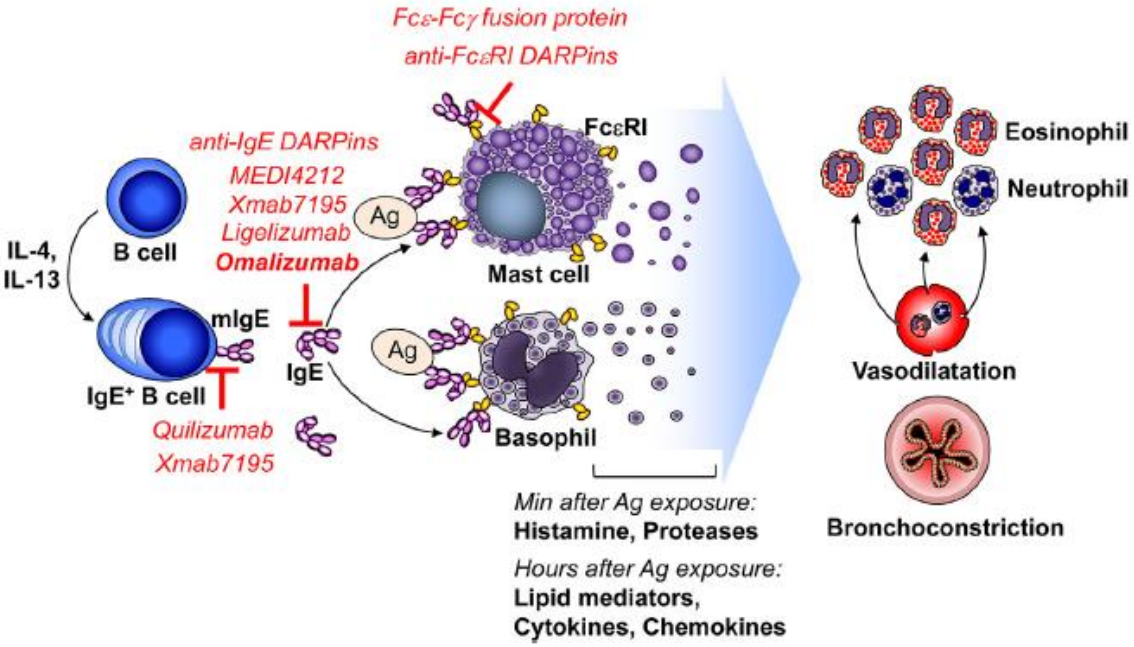


Figure 3: Key role of IgE in allergic reactions[68]

Pathophysiologic role of IgE in Allergy and Asthma

B cells become IgE-producing cells after being stimulated with the TH2 cytokines IL-4 and IL-13. IgE attaches to the FcRI receptor on the surface of tissue mast cells and blood basophils, which has a high affinity for it. When allergic patients are exposed to an allergen, allergen-specific IgE on the surface of mast cells and basophils crosslinks FcRI, causing degranulation and the immediate release of histamine, proteases, and other preformed mediators, as well as de novo synthesis of lipid mediators (prostaglandins, leukotrienes,...), cytokines, and chemokines. These mediators can act locally or systemically, causing symptoms of acute hypersensitivity as bronchoconstriction, urticaria, diarrhoea, and vasodilation (when acting locally in the airways, skin, and gut, respectively). Late-phase allergic responses, which involve the recruitment of leukocytes, primarily eosinophils and neutrophils, are also mediated by these mediators. To prevent the effects of IgE, a number of medications have been created. These medicines work by inhibiting IgE synthesis, blocking free IgE, or competing with IgE for FcRI binding. Omalizumab, a humanised anti-IgE mAb that blocks free IgE, is the only anti-IgE medication licenced by the FDA for the treatment of moderate to severe persistent allergic asthma and chronic spontaneous urticaria (CSU).[68]

Eosinophils in Allergic rhinitis

Allergic rhinitis is a type 2 inflammatory disease of the nasopharynx caused by the interaction of airborne allergens with inflammatory infiltrates composed primarily of eosinophils, mast cells, basophils, and T cells, which release granule proteins, cytokines, and chemokines to trigger the onset of clinical symptoms.[49]

It is well known that eosinophils play a significant role in chronic allergic disorders.[70,71] In individuals with allergic rhinitis, the amount of eosinophils in nasal smear was found to be highly linked with nasal airflow resistance and spirometric indices.[72] After allergen exposure,

allergic rhinitis patients had significantly higher numbers of activated and degranulated eosinophils.[73–75] Eosinophils can exacerbate allergic inflammation in mice models of allergic lung inflammation by encouraging the activation of T helper type 2 (Th2) cells and communicating with dendritic cells.[76,77] Eosinophils can also release preformed Th2 cytokines such interleukin-4 (IL-4) and IL-13, which help to stimulate the type 2 response.[78–80] Recently, it has been proposed that eosinophils' activated and pathogenic states, like those of other immune cell populations with phenotypic and functional abnormalities, are directly engaged in the development of eosinophil-associated illnesses such as allergic asthma and eosinophilic esophagitis.[80,81]

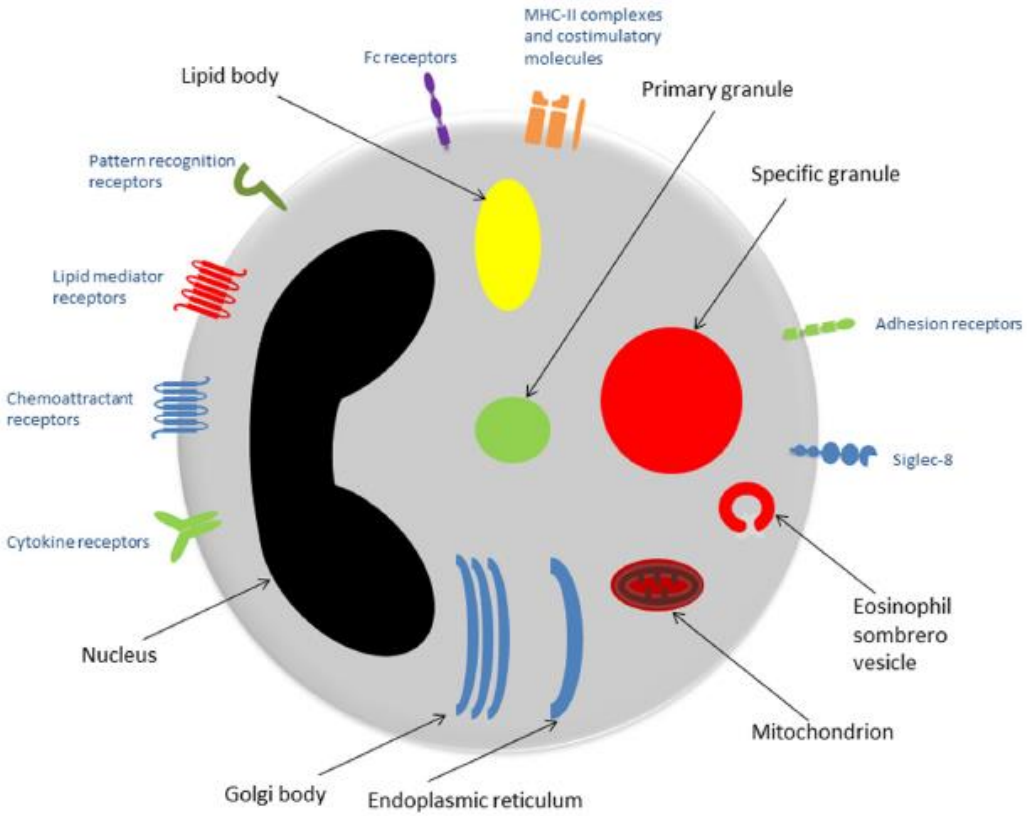


Figure 4: Eosinophil ultrastructure

The Eosinophil's role in Asthma Pathophysiology

The relative contributions of the numerous cytokine networks involved in asthma pathogenesis vary between patients. Airway hyperresponsiveness (AHR), mucus hypersecretion, tissue injury, and airway remodelling are all common hallmarks.

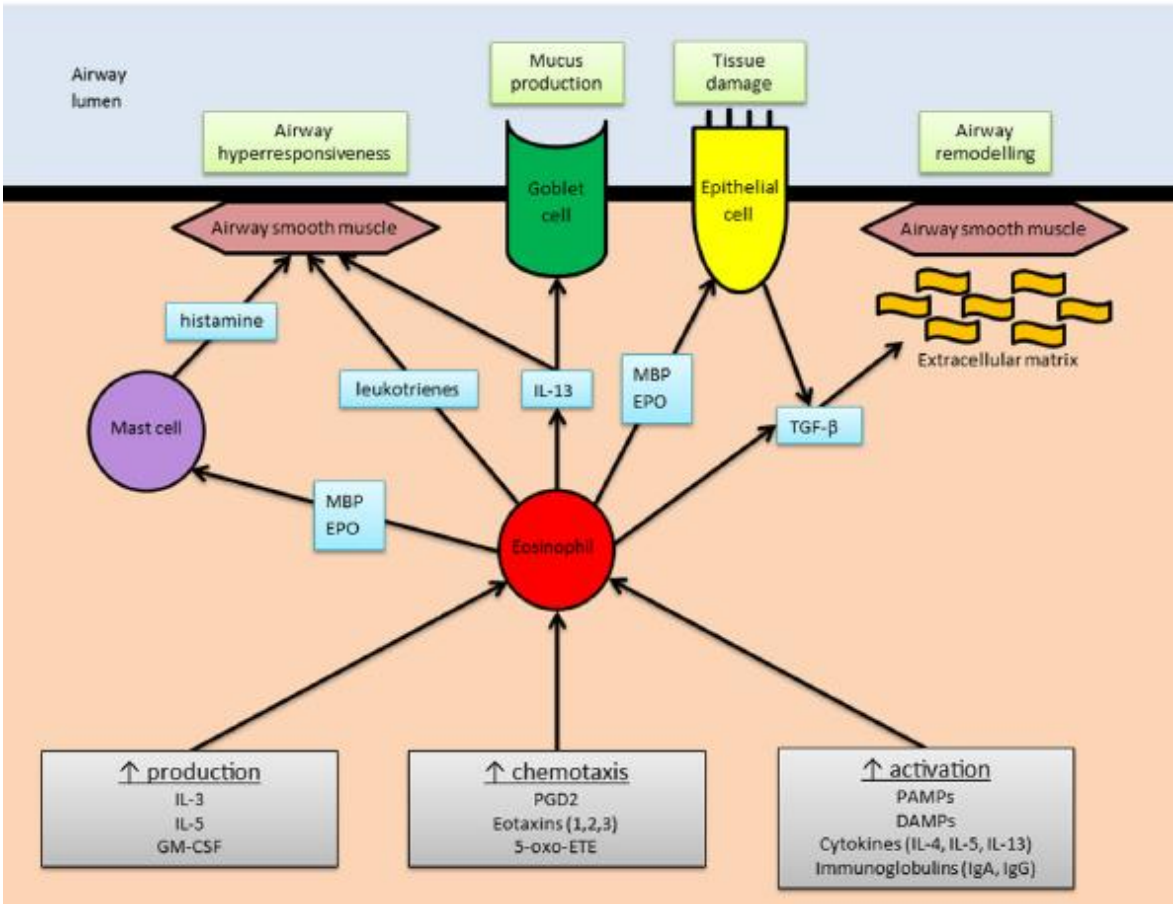


Figure 5: The role of eosinophils in asthma.

Eosinophil counts in peripheral blood and bronchoalveolar lavage (BAL) fluid have long been found to be greater in asthmatics than in healthy controls. Increased expression of TH2 cytokines, particularly IL-5, is found in BAL fluid from individuals with atopic asthma, which is significantly linked to eosinophilic inflammation. In general, the degree of eosinophilia is related to the severity of the disease and the frequency of exacerbations. Non-eosinophilic asthma phenotypes, on the other hand, are recognised. Peripheral blood eosinophilia can also be caused by a variety of other factors.[71]

Similar articles establishing the role of IGE, AEC and DNE in Allergic Rhinitis

- A cross sectional study was conducted by Muddiah et al[13] among 160 study subjects with signs and symptoms of allergic rhinitis were investigated with total serum IgE levels and absolute eosinophil count. According to the ARIA classification, 66.3 percent had mild allergic rhinitis, 6.9% had moderate allergic rhinitis, and 26.9% had severe allergic rhinitis. 71.9 percent had elevated Total Serum IgE levels, while 59.4 percent had eosinophilia. In patients with allergic rhinitis, total IgE levels and eosinophilia have a substantial association. According to the findings, total serum IgE levels and absolute eosinophil counts should be performed in all cases of rhinitis since they are cost-effective and predict atopy.
- Blinded, prospective cohort study was conducted by Psaltis et al[10] compared three existing endoscopic scoring systems and a newly proposed modified scoring system for the assessment of patients with chronic rhinosinusitis. A total of 102 CRS patients were enrolled in the study. Among all scoring systems, the MLK system had the highest inter-rater and test-retest reliability. Except for the DIP, all systems correlated with overall VAS scores. In both unoperated and postoperative patients, the MLK was the only system that linked with the SNOT-22 symptom subscore. They concluded that removing the scarring and crusting subscores from the LK system increases its reliability and association with PROMs. For clinical practise and outcomes research, the MLK system may be a more appropriate and trustworthy endoscopic grading method.
- A prospective clinical correlation study conducted by Rudrappa et al[1] in India by 2019 among 60 children of age group between 2 to 18 years. They discovered that the most prevalent symptoms in children with allergic rhinitis were a runny nose and nasal blockage, followed by sneezing and itching. In comparison to blood eosinophilia, nasal

eosinophilia aids in the diagnosis of allergic rhinitis. Only 21 children (35%) had a blood eosinophil count of >440 cells/mm3 in this investigation. The most common type of allergic rhinitis was mild intermittent allergic rhinitis.

- Nathan et al[82] conducted a study with the aim of assessing the effectiveness of DNE in comparison with CT for evaluating CRS. Eighty people who met the diagnostic symptom criteria for CRS had CT scans of their nostrils and paranasal sinuses (PNS) as well as DNE. Based on the CT and DNE, all individuals received standard Lund–Mackay and Lund–Kennedy ratings. A comparison analysis was carried out. In comparison to CT, DNE exhibited a sensitivity of 92.31 percent, a specificity of 73.33 percent, a positive predictive value of 93.75 percent, a negative predictive value of 68.75 percent, and a diagnostic accuracy of 88.75 percent. Conclusion: Nasal endoscopy should be employed as an early diagnostic tool in the clinical assessment of suspected CRS patients, according to the researchers. DNE aids in the reduction of CT usage, lowering costs and reducing radiation exposure.
- A cross sectional study was conducted by Chowdary et al[12] in 2003. And they found that in these cases, the existence of a deviated nasal septum and hypertrophied turbinates raises the question of whether surgery is required or whether medicinal therapy will suffice. The mean serum IgE levels and peripheral eosinophil counts in controls and VMR cases were essentially identical. Serum IgE levels in allergic rhinitis (AR) were higher during acute symptoms, Sino nasal polyposis, and fungal involvement. In AR patients, however, eosinophil levels in the peripheral blood were not raised. IgE levels and peripheral counts were also higher in rhinitis patients with asthma. Total blood IgE levels and peripheral eosinophil counts, as well as other tests such as a CT scan of the PNS, were advised in all cases presenting with suspected allergic rhinitis symptoms.

- A two-year prospective study conducted by Agrawal et al[83] on 105 cases, clinically diagnosed as allergic rhinitis. For each patient, the absolute eosinophil count and total serum IgE were reported. Statistical tests were used to determine the diagnostic utility of each parameter. In 42 percent of the cases, peripheral blood eosinophils were greater than 6%. Absolute eosinophil count was high >450 cells/cu mm in 49 (46.6 percent) of the cases, while serum IgE was elevated >120IU/ml in 73 (69.5 percent) of the cases. Only 39 (37.1%) of the cases had both AEC and Serum IgE elevated. Thirty-nine (37.1%) instances demonstrated an increase in AEC and serum IgE at the same time. When both tests were considered combined, the diagnosis of allergic rhinitis did not change considerably. Individually, however, 49 (46.6 percent) individuals had a high absolute eosinophil count, and 73 (69.5 percent) cases had elevated serum IgE. Although not statistically significant, testing for serum IgE levels was shown to be more accurate and diagnostically useful.
- The observational study was conducted by Trisha et al[84] in India by 2018 among 80 patients with allergic rhinitis were included. They were divided into three categories based on their symptoms: mild, moderate, and severe allergic rhinitis, and were treated using the ARIA guidelines' step-by-step therapeutic approach. The pre-therapeutic value of serum IgE for the study population was 322.21 IU/ml. The pre-therapeutic value of serum AEC for the research population was 475.9 cells/mm3. They came to the conclusion that serum IgE and AEC are reliable indicators of allergic rhinitis.
- The observational study conducted by Liu et al[7] included total of 105 patients with AR induced by house dust mites were enrolled and treated with standardized *Dermatophagoides farinae* (*D. farinae*) drops for 1 year. At baseline, 6 months, and 12 months, the total nasal symptoms score (TNSS), total medication score (TMS), visual analogue scale (VAS), and MLK scores were evaluated. The MLK score was also

compared to the TNSS, TMS, and VAS scores. The nasal endoscopic findings revealed a considerable improvement in nasal symptoms, including turbinate mucosa colour change, nasal secretion reduction, and nasal edoema improvement. MLK scores decreased significantly, and there was a positive association between MLK and VAS scores. They came to the conclusion that the MLK scores might be used as a supplement to assess the efficacy of SLIT in clinical practise and outcomes research.

- The prospective observational study done by Baba Caliaperoumal et al[85] included 70 patients with CRS. They found a moderate association between the symptom score and the Lund-Kennedy Score (r = 0.643, p 0.001) and a high degree of correlation between the symptom score and the Lund-Mackay Score (r = 0.835, p 0.001). The Lund-Kennedy score and the Lund-Mackay score had a favourable connection. They came to the conclusion that DNE can be used as an early diagnostic tool in the clinical evaluation of CRS, and that it is just as useful as CT in diagnosing the condition.

MATERIALS AND METHODS

Study Design:

Cross sectional Analytical study

Study Area:

Outpatient department of ENT in Velammal Medical College and research institute, Velammal Village, Madurai

Study Period and Duration:

10 months (Nov 2020-Aug 2021)

Study Population:

Allergic rhinitis based on typical history and clinical features in the age group 10 to 60 -years-old attending outpatient department of ENT in Velammal Medical College and research institute, Madurai

Sample Size Calculation:

Reported incidence of allergic rhinitis in India also ranges between 20% and 30% and it was mentioned by Chandrika in her study. [15] The sample size was calculated with a confidence interval of 95%. Anticipated proportion of allergic rhinitis according to similar studies conducted in India was 30% and with the total width of confidence interval being 0.09, the sample size for the normal approximation of binomial calculation was 100.

$$\text{Alpha } (\propto) = (1\text{-CL})/2 = 0.025$$

Standard normal deviate for alpha $= Z\propto = 1.960$

Sample size $= N = 4Z\propto 2P(1\text{-}P)/W2 = 100$

Sampling Method:

All Allergic Rhinitis patients fulfilling my criteria, will be included in my study till my desired sample size is reached.

Inclusion Criteria

- Age of the patients ranging from 10 to 60 years
- Both male and female patients are included
- Patients with allergic symptoms Sneezing, running nose, nasal obstruction, Nasal and Eye itching, disturbance in sleep

Exclusion criteria

- Previous Nasal surgery
- Snuff powder users
- Chronic sinusitis, chronic tonsillitis, CSOM
- Pregnancy/ lactating mothers
- Immuno-compromised patients
- Patients on nasal / oral steroids
- Patients currently on treatment for allergy

Study Tools

Table 5: MODIFIED LUND -KENNEDY ENDOSCOPY SCORE

Findings	0	1	2
Colour	Pink/Normal	Pale	Bluish
Oedema	Absent	Mild	Severe
Discharge	Absent	Clear thin discharge	Purulent
Polyp	Absent	Only in MM	Beyond MM

Modified Lund-Kennedy (MLK) endoscopic scoring system, which retains the LK sub scores of polyps, oedema, and discharge but eliminates the scoring of scarring and crusting. And added colour of nasal mucosa.

Method of data collection

The history, clinical features and investigations were noted in a proforma specially designed for the study. All patients were evaluated carefully with clinical examination of ear, nose, throat and Respiratory system. The clinical signs and of allergic rhinitis include bogy oedematous nasal mucosa, turbinate hypertrophy, and thin watery mucous in nose. The features of associated allergic conjunctivitis are lid oedema, congestion of conjunctiva, watering and itching around the eyes. Allergic rhinitis with asthma is characterised by features of allergic rhinitis and wheeze from lungs. Total serum IgE levels were measured using CLIA which was represented as IU/ml. AEC was reported from the total count and differential count and by the direct method using light microscope.

Study Variables

- Age
- Gender
- Family history of Allergic Rhinitis
- Occupation
- Chief complaints
- Absolute Eosinophil count
- IGE level
- Modified Lund Kennedy Endoscopy total score

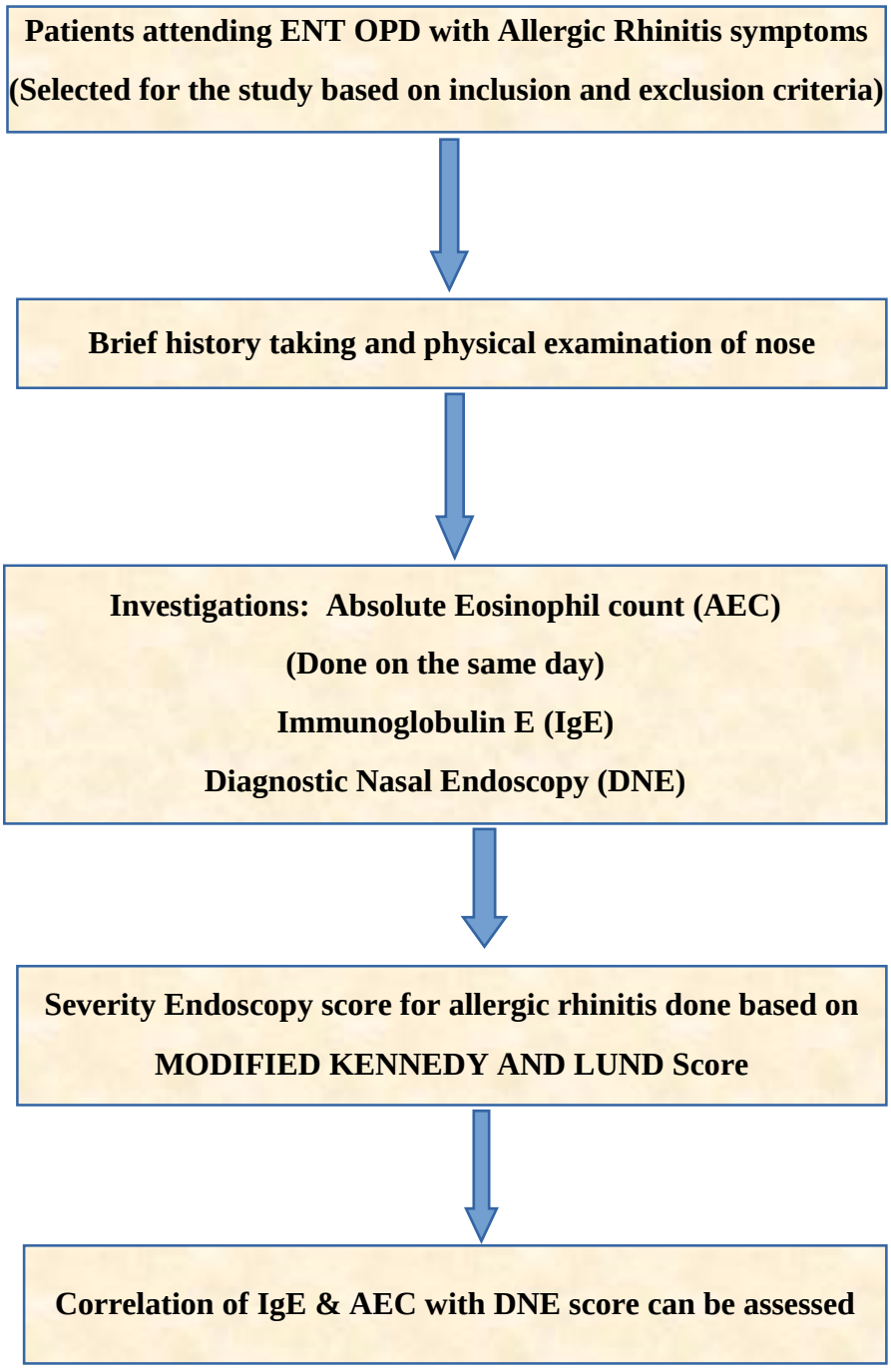
Ethical Consideration

The current Study was permitted by institutional human ethics committee. Informed written consent was obtained from all the participants and only those participants willing to sign the informed consent were counted in the study. The jeopardies and profits related in the study and voluntary nature of participation were clarified to the participants before getting consent. Confidentiality of the study samples was maintained.

Data Analysis

- The collected data were entered in MS excel and analysed using IBM.SPSS statistics software 23.0 Version.
- To describe the data in descriptive statistics frequency analysis, percentage analysis was used for discrete variables. Mean, Median and Standard deviation was used for continuous variables.
- To describe the data in inferential statistics Discrete variables in the three groups was compared for statistically significant difference using Chi Square test.
- The validity of the Modified Lund Kennedy endoscopy scale was assessed by Cronbach's alpha method in Reliability analysis
- The correlation of IGE level and AEC with Modified Lund Kennedy endoscopy total score were determined by Spearman's rank correlation.
- In all the above statistical tools the probability value 0.05 was considered as significant level.

FLOWCHART OF METHODOLOGY



RESULT

Table 6: Distribution of study participants based on age

Age distribution	
Mean	31.42
Median	29.50
Mode	27
Std. Deviation	10.433
Minimum	11
Maximum	57

Comment: The mean age of the study samples is 31.42 ± 10.433 ranging from 11 to 57 years

Table 7: Distribution of study participants based on age group

Age group (years)	Frequency	Percentage
11 - 20	13	13.0
21 - 30	42	42.0
31 - 40	26	26.0
41 - 50	12	12.0
51 - 60	7	7.0
Total	100	100.0

Comment: In the present study nearly 13% of the patients belongs to 11-20years age group; 42% of the patients belongs to 21-30years age group; 26% of the patients belongs to 31-40years age group; 12% of the patients belongs to 41-50years age group and only 7% of the patients belongs to 51-60years age group.

Inference: The number of patients in 21-30 years age group are higher than other age group patients.

Figure 6: Distribution of **study participants based on age group**

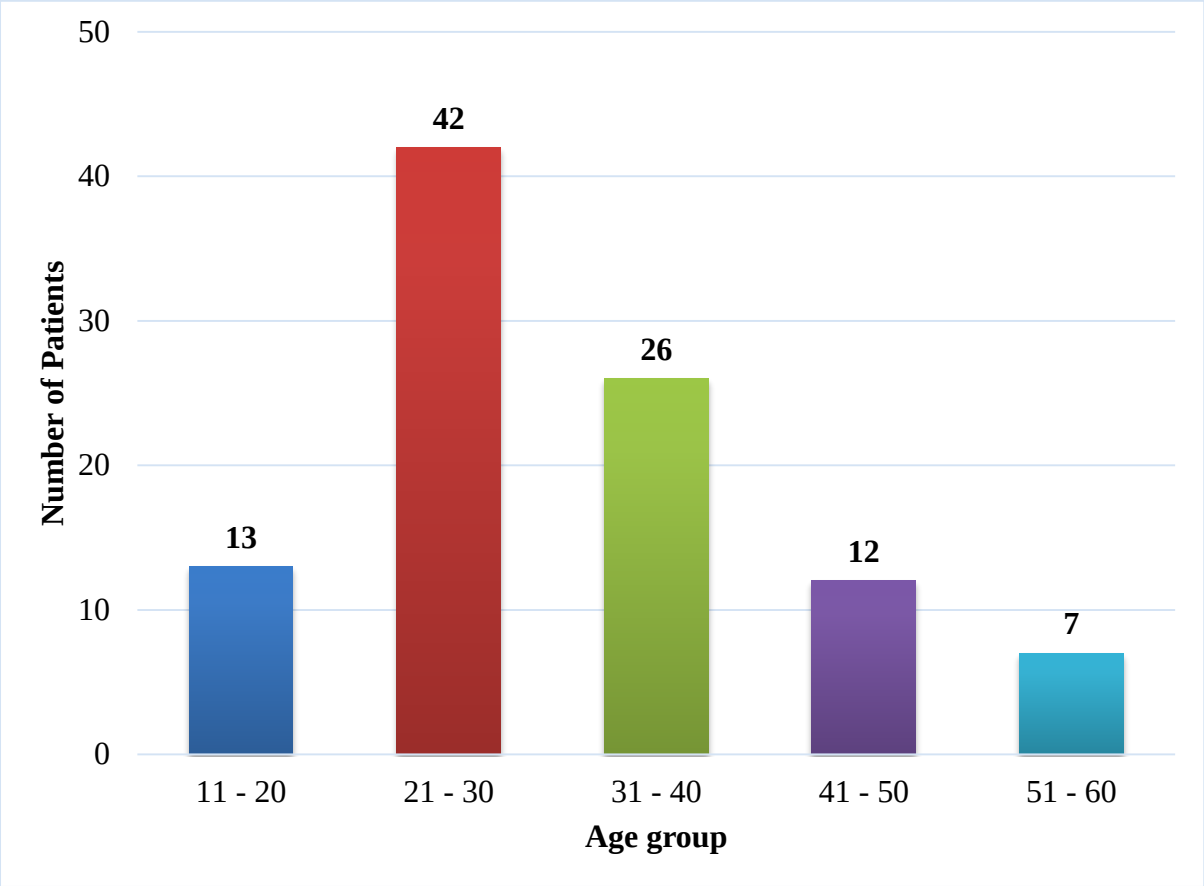


Table 8: Distribution of study participants based on gender

Gender	Frequency	Percentage
Male	33	33.0
Female	67	67.0
Total	100	100.0

Comment: About 33% of the study subjects were male and the remaining 67% are females.

Figure 7: Distribution of study participants based on gender

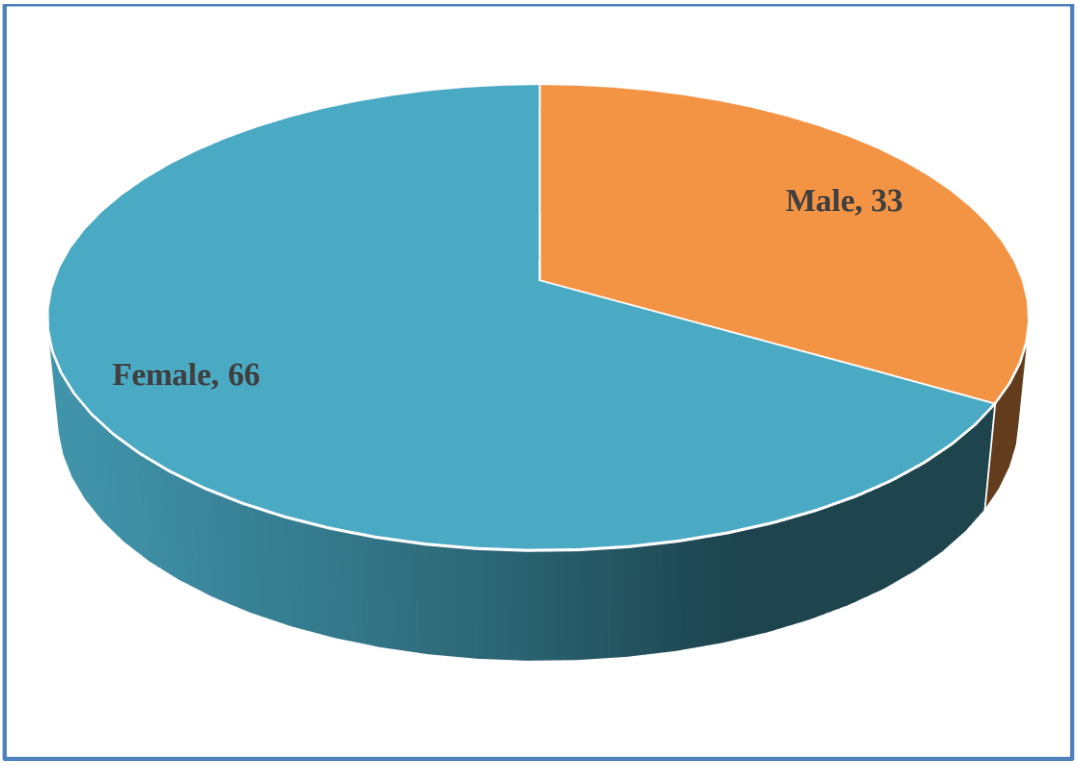


Table 9: Distribution of study participants based on occupational status

Occupation	Frequency	Percentage
House Wife	46	46.0
Student	27	27.0
Business	15	15.0
Farmer	9	9.0
Driver	3	3.0
Total	100	100.0

Comment: In the present study nearly 46% of the patients were housewives; 27% of the patients were students; 15% of the patients were doing own business; 9% of the patients were farmers and only 3% of the patients were drivers.

Inference: The major occupation in the study samples were housewives (46%).

Figure 8: Distribution of study participants based on occupational status

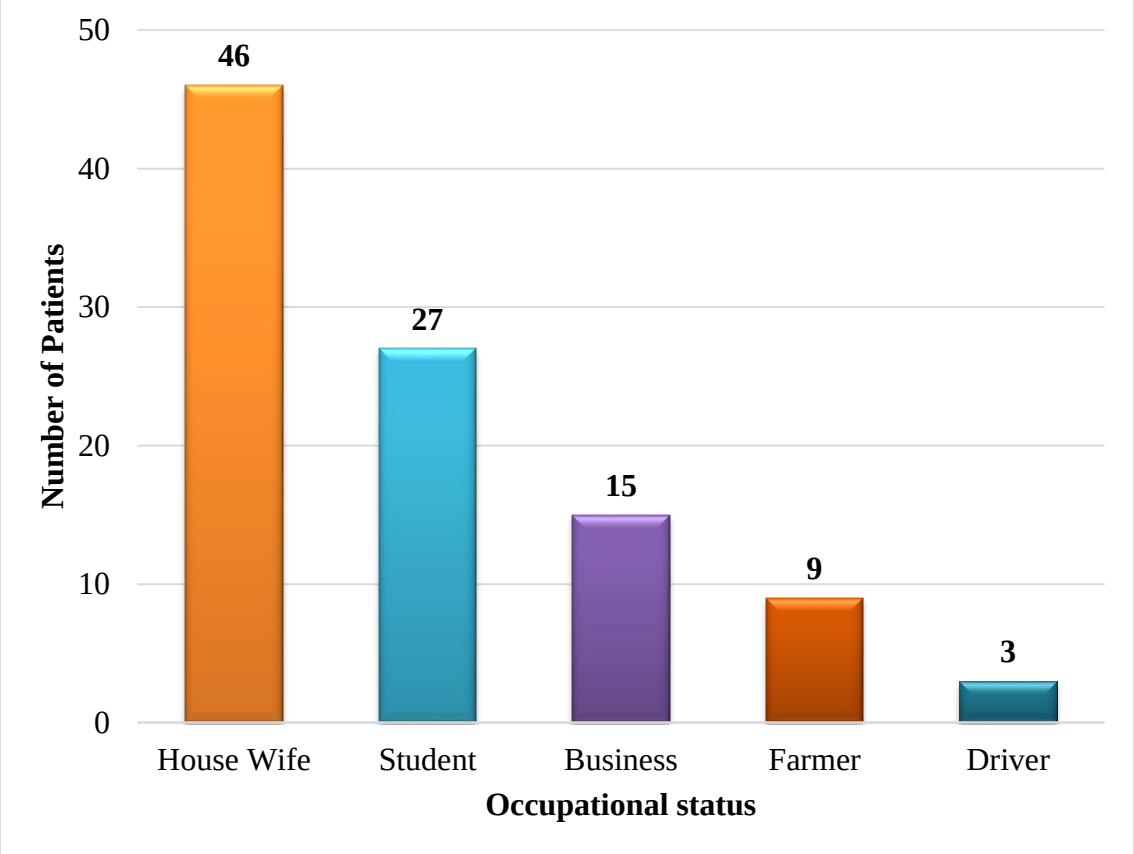


Table 10: Distribution of study participants based on presenting symptoms

Symptoms	Frequency	Percentage
Nasal Obstruction	55	55.0
Recurrent Sneezing	29	29.0
Running Nose	16	16.0
Total	100	100.0

Comment: In the present study nearly 55% of the patients had presenting complaints of nasal obstruction; 29% of the patients had presenting complaints of recurrent sneezing and only 16% of the patients had presenting complaints of running nose.

Inference: The major symptoms in the study samples were nasal obstruction (55%).

Figure 9: Distribution of study participants based on presenting symptoms

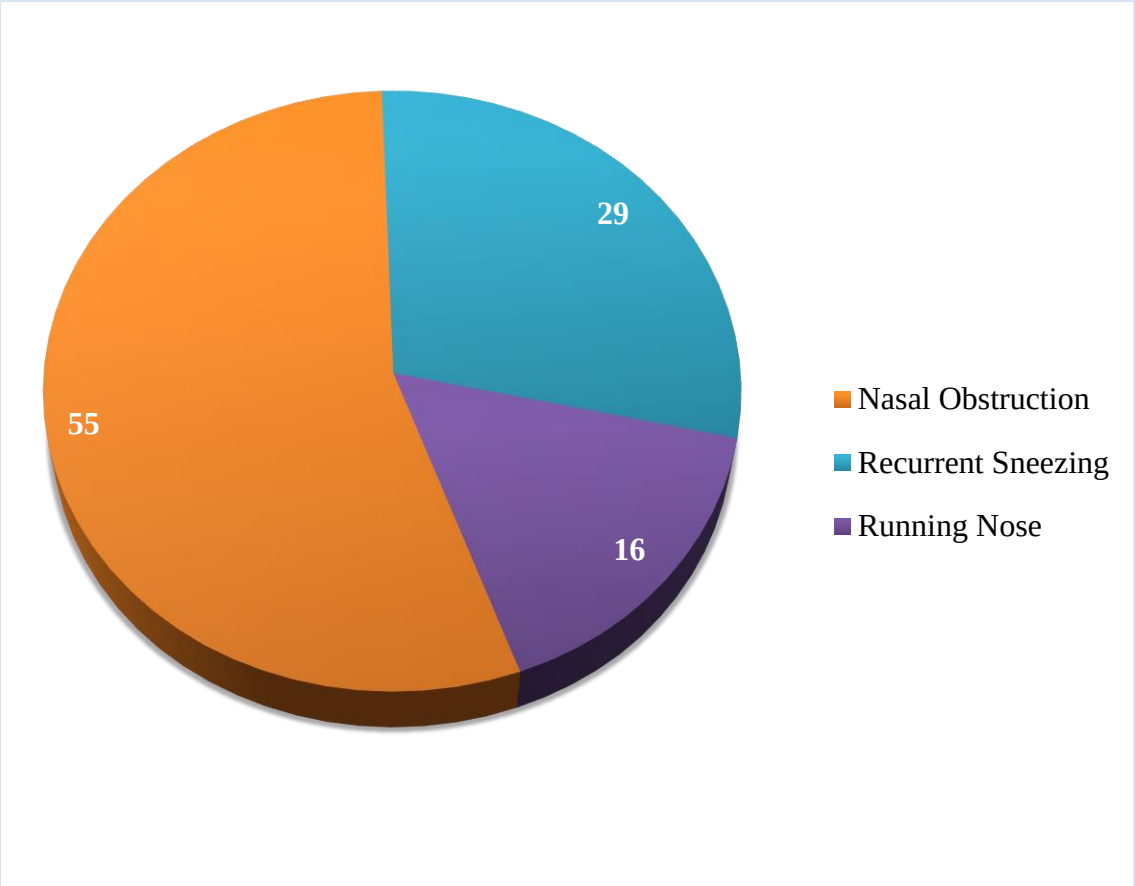


Table 11: Distribution of study participants based on family history of Allergic Rhinitis

Family History	Frequency	Percentage
Present	18	18.0
Absent	82	82.0
Total	100	100.0

Comment: In the present study nearly 18% of the patients had family history of Allergic rhinitis.

Figure 10: Distribution of study participants based on family history of Allergic Rhinitis

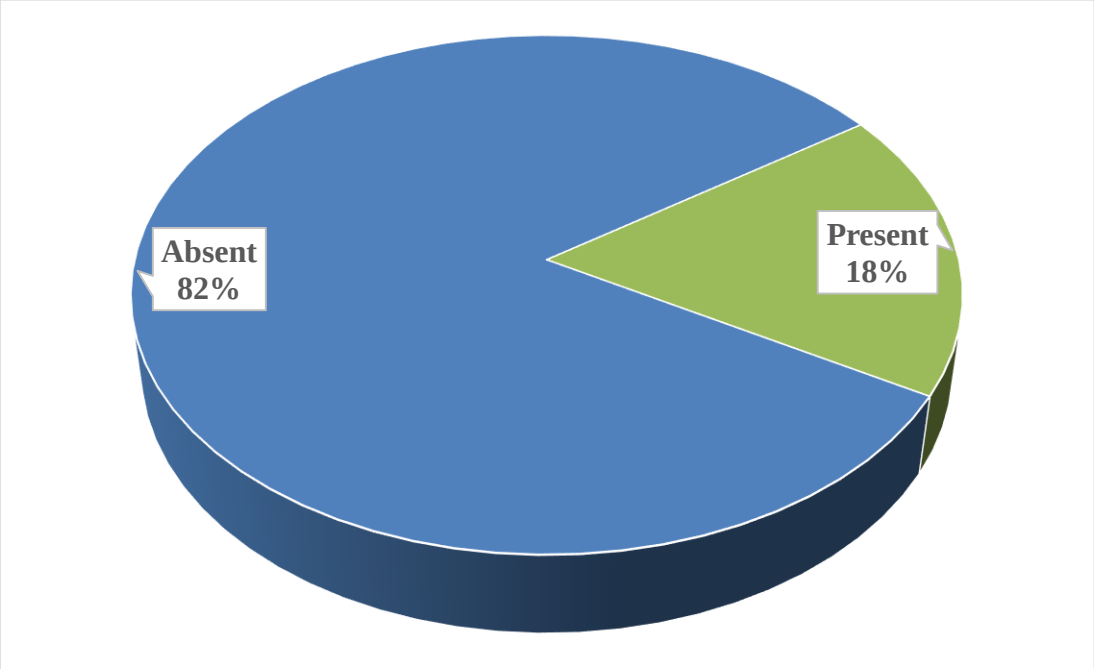


Table 12: Distribution of study participants based on the color appeared in DNE among allergic rhinitis patients.

Color	Frequency	Percentage
Pale	76	76.0
Blue	24	24.0
Total	100	100.0

Comment: In the present study nearly 76% of the patients showed pale colour in the DNE findings and the remaining 24 % showed blue colour.

Figure 11: Distribution of study participants based on the colour appeared in DNE among allergic rhinitis patients.

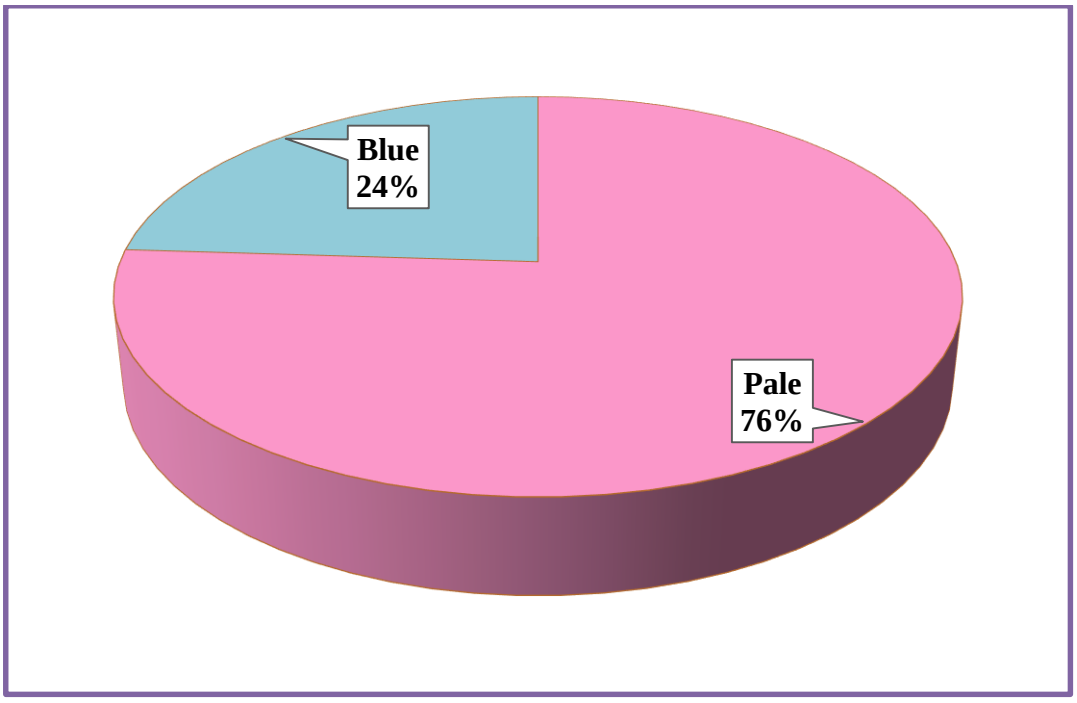


Table 13: Distribution of study participants based on the presence of oedema appeared in DNE among allergic rhinitis patients.

Edema	Frequency	Percentage
Absent	10	10.0
Present	90	90.0
Total	100	100.0

Comment: In the present study nearly 90% of the patients showed edema in the DNE findings and the remaining 10 % did not showed edema.

Figure 12: Distribution of study participants based on the presence of oedema appeared in DNE among allergic rhinitis patients.

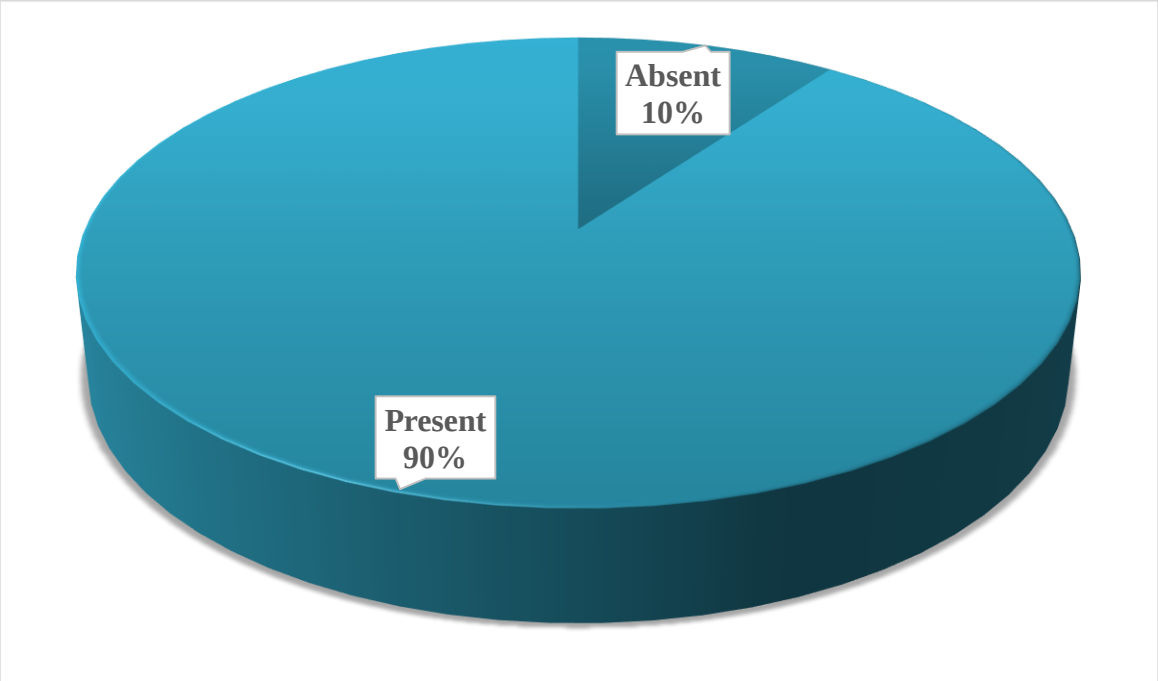


Table 14: Distribution of study participants based on the presence of discharge appeared in DNE among allergic rhinitis patients.

Discharge	Frequency	Percentage
Absent	56	56.0
Present	44	44.0
Total	100	100.0

Comment: In the present study nearly 44% of the patients showed discharge in the DNE findings and the remaining 56 % did not showed discharge.

Figure 13: Distribution of study participants based on the presence of discharge appeared in DNE among allergic rhinitis patients.

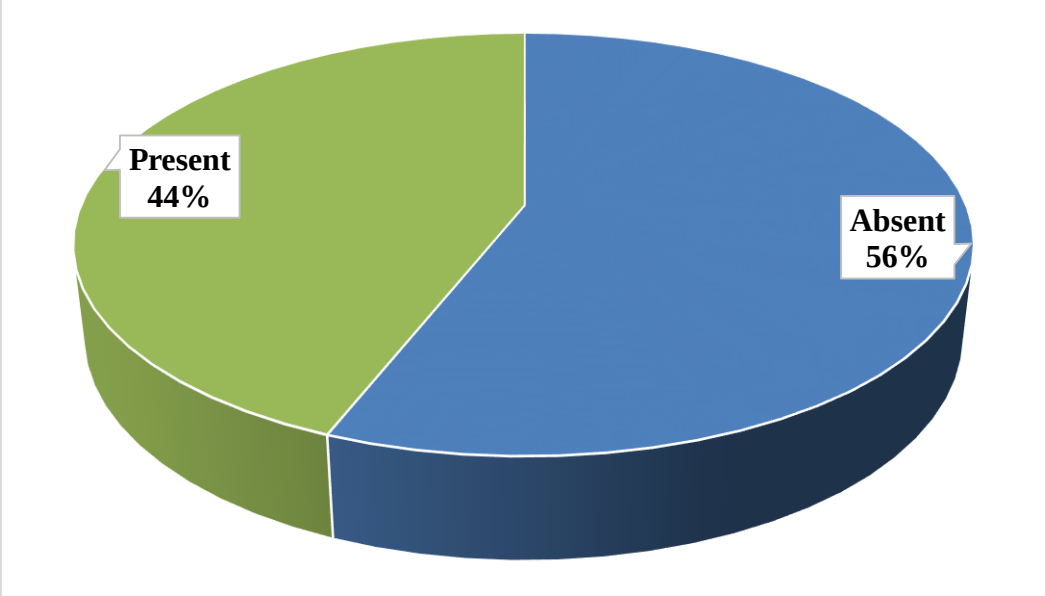


Table 15: Distribution of study participants based on the presence of Polyp appeared in DNE among allergic rhinitis patients.

Discharge	Frequency	Percentage
Absent	74	74.0
Present	26	26.0
Total	100	100.0

Comment: In the present study nearly 26% of the patients showed polyp in the DNE findings and the remaining 74 % did not showed polyp.

Figure 14: Distribution of study participants based on the presence of discharge appeared in DNE among allergic rhinitis patients.

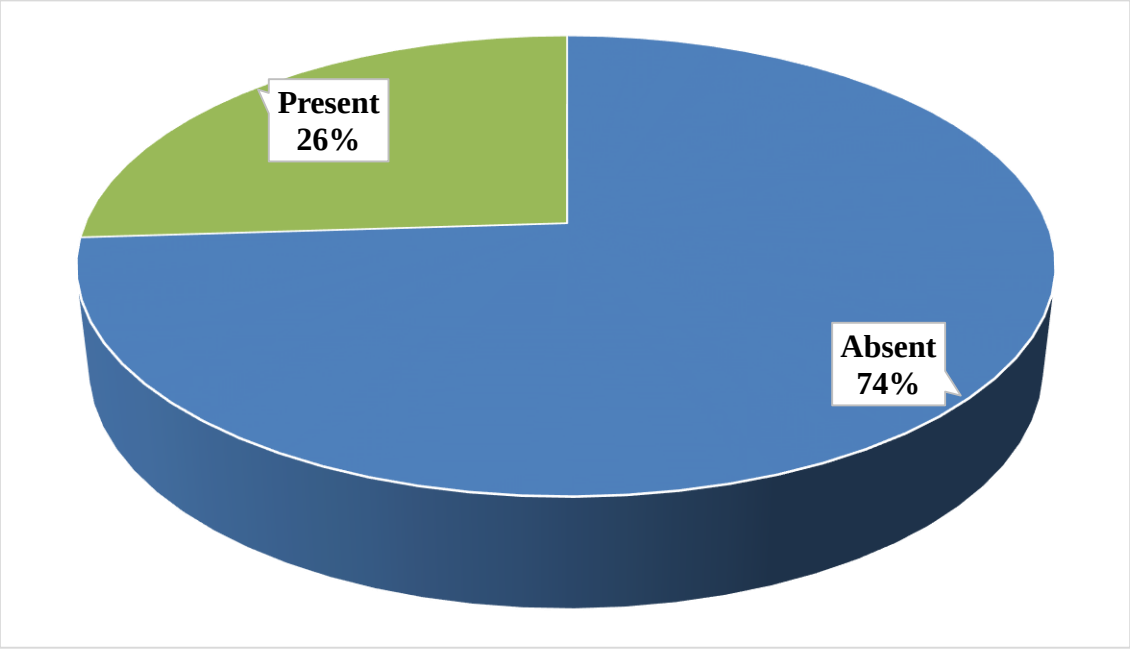


Table 16: Distribution of study participants based on the Blood parameters

	Absolute Eosinophil Count	Immunoglobulin E level
Mean	340.22	1239.25
Median	300	600
Mode	300	400
Std. Deviation	182.07	1238.213
Skewness	1.515	1.3
Minimum	100	47
Maximum	1200	4560

Comment: In the present study the mean Absolute Eosinophil Count of the study subjects were 340.22 ± 182.07 ranging from 100 to 1200. the mean Immunoglobulin level of the study subjects were 1239.25 ± 1238.21 ranging from 47 to 4560.

Table 17: Distribution of study participants based on the Absolute Eosinophil Count

Absolute Eosinophil count	Frequency	Percentage
< 100	12	12.0
100 - 200	19	19.0
200 - 300	25	25.0
300 - 400	20	20.0
> 400	23	23.0
Total	100	100.0

Comment: In the current study nearly 12% of the allergic rhinitis patients' blood AEC falls below 100; 19% of the allergic rhinitis patients' blood AEC falls between 100-200; 25% of the allergic rhinitis patients' blood AEC falls between 200-300; 20% of the allergic rhinitis patients' blood AEC falls between 300-400; 23% of the allergic rhinitis patients' blood AEC falls above 400.

Figure 15: Distribution of study participants based on the Absolute Eosinophil Count

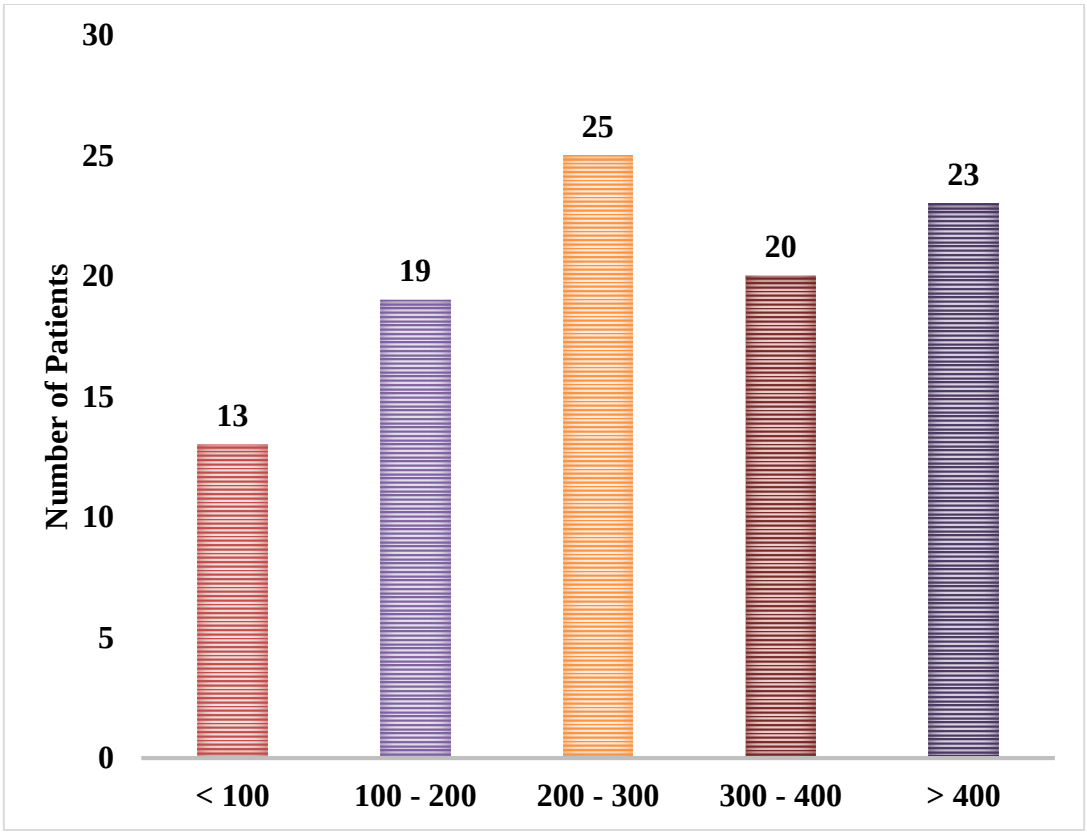


Table 18: Distribution of study participants based on Immunoglobulin E level

Immunoglobulin E level	Frequency	Percentage
< 500	46	46.0
500 - 1000	13	13.0
1000 - 1500	10	10.0
1500 - 2000	9	9.0
2000 - 2500	7	7.0
2500 - 3000	2	2.0
> 3000	13	13.0

Comment: In the current study nearly 46% of the allergic rhinitis patients' blood IGE level falls below 500; 13% of the allergic rhinitis patients' blood IGE falls between 500-1000; 10% of the allergic rhinitis patients' blood IGE falls between 1000-1500; 9% of the allergic rhinitis patients' blood IGE falls between 1500-2000; 7% of the allergic rhinitis patients' blood IGE falls above 2000-2500; 2% of the allergic rhinitis patients' blood IGE falls above 2500-3000 and 13% of the allergic rhinitis patients' blood IGE falls above 3000.

Figure 16: Distribution of study participants based on Immunoglobulin E level

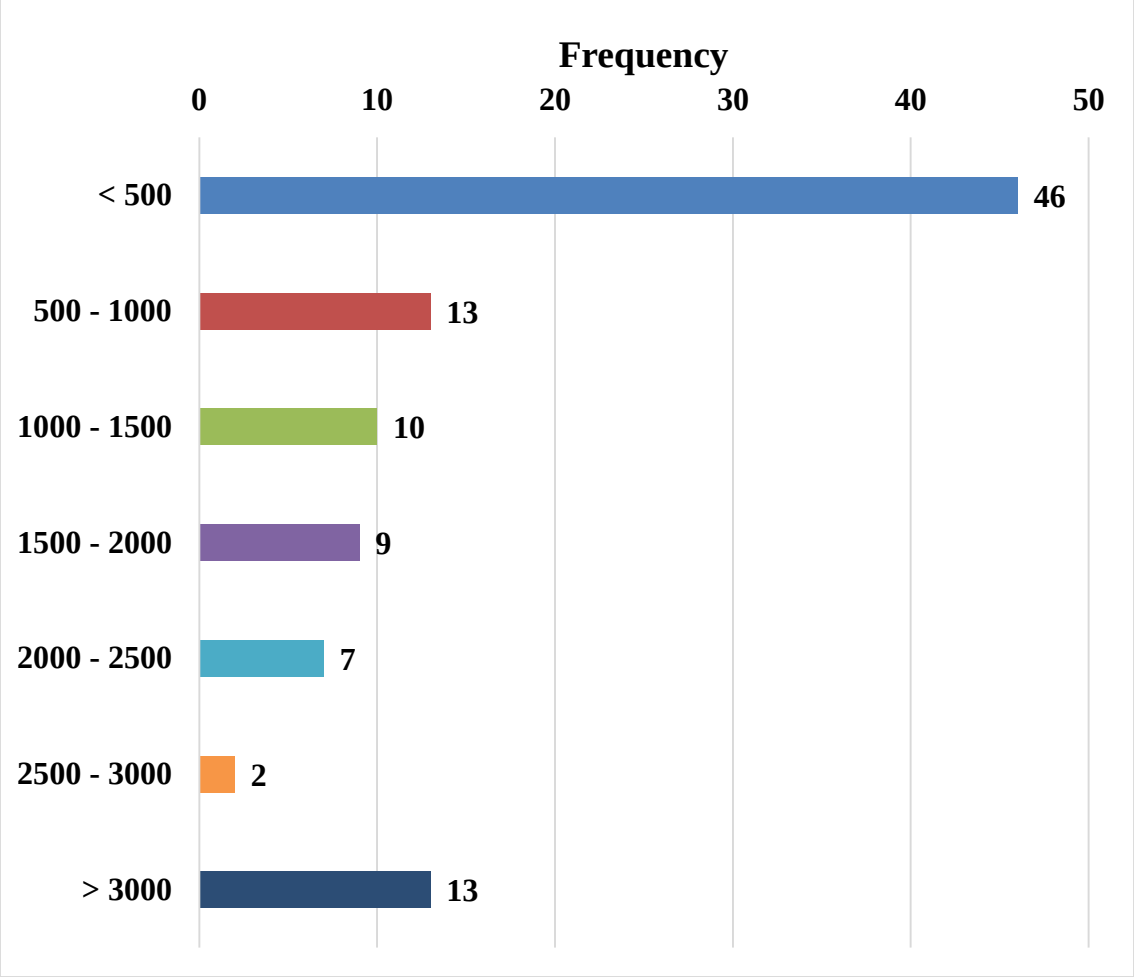


Table 19: Mean score and SD for each question of the Modified Lund Kennedy Endoscopy score (Cronbach's Alpha =0.764)

Q.no	Questions	Mean	Standard deviation	Cronbach's Alpha if Item deleted
1	Colour of mucosa	1.24	0.429	0.646
2	Oedema	0.90	0.302	0.829
3	Discharge	0.44	0.499	0.627
4	Polyp	0.28	0.494	0.657

The internal validity of using Modified Lund Kennedy Endoscopy finding in the present study was explored using reliability analysis in SPSS. The Cronbach's alpha score of Modified Lund Kennedy Endoscopy finding total score and if any of the items deleted was 0.764 which is more than 0.7 (good consistency). Hence the reliability of the scale is proved i.e the scale is reliable for the purpose of data collection. Table 14 illustrations the descriptive data for each item and also the Cronbach's alpha values if each individual item were to be deleted. All Cronbach's α values were equally good (α values ranging from 0.627 to 0.829). Such items revealed that Modified Lund Kennedy Endoscopy scale did not necessitate to confiscate any of the items to enhance the reliability.

Table 20: Distribution of study participants based on Modified Lund Kennedy Endoscopy Score

Modified Lund Kennedy Endoscopy Score	Frequency	Percentage
< 2	10	10.0
2 - 4	71	71.0
> 4	19	19.0
Total	100	100.0

Comment: In the present study, nearly 71% of the patients presented with total score of Modified Lund Kennedy Endoscopy scale ranging between 2 to 4. About 19% patients' score was >4 and 10% patients' score were <2.

Figure 17: Distribution of study participants based on Modified Lund Kennedy Endoscopy Score

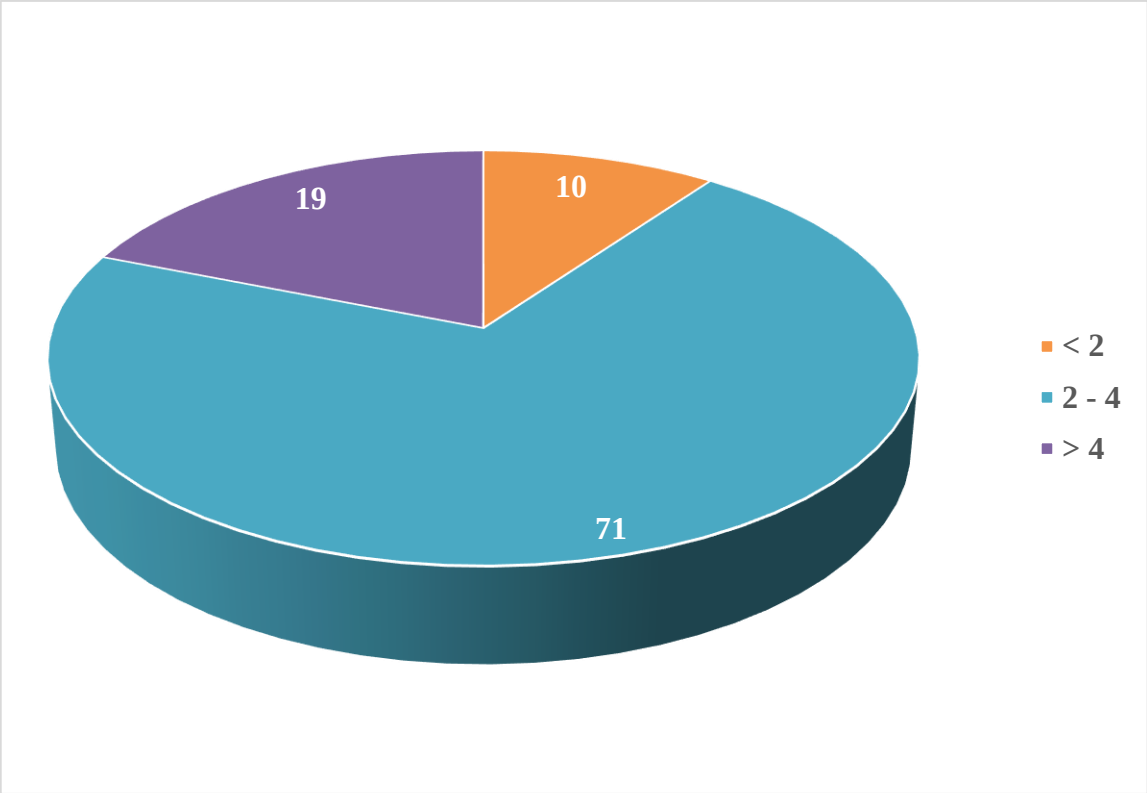


Table 21: Association between age group and Modified Lund Kennedy Endoscopy Score by Chi-square test

Parameter		Modified Lund Kennedy Endoscopy Score			P-Value
		< 2 10/100	2 - 4 71/100	> 4 19/100	
Age	11 - 20	1	10	2	0.826
		7.7%	76.9%	15.4%	
	21 - 30	5	28	9	
		11.9%	66.7%	21.4%	
	31 - 40	2	20	4	
		7.7%	76.9%	15.4%	
	41 - 50	1	7	4	
		8.3%	58.3%	33.3%	
	51 - 60	1	6	0	
		10%	71%	19%	

Chi-square value = 4.337

Comment: The prevalence of moderate Allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score from 2 to 4) among 11-20 years and 31-40 years (76.9%) was higher than other age group. The prevalence of moderate Allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score >4) among 41-50 years (33.3%) was higher than other age group. The prevalence of mild Allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score <2) among 21-30 years (11.9%) was higher than other age group. The difference in proportion of allergic rhinitis between the age groups was not statistically significant by chi-square test (p-value =0.826).

Figure 18: Association between age group and Modified Lund Kennedy Endoscopy Score by Chi-square test

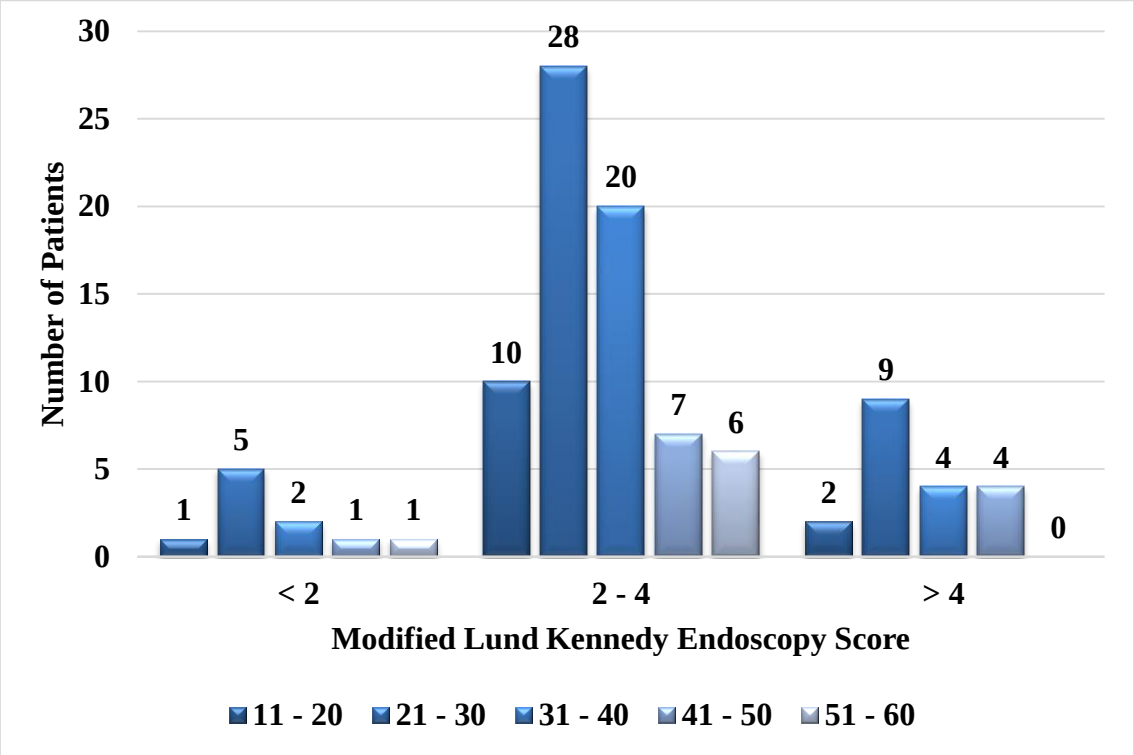


Table 22: Association between gender and Modified Lund Kennedy Endoscopy Score by Chi-square test

Gender	Modified Lund Kennedy Endoscopy Score			P-Value
	< 2 **10/100**	**2 - 4** **71/100**	**> 4** **19/100**	
Male	5	21	7	0.405
	15.2%	63.6%	21.2%	
Female	5	50	12	
	7.5%	74.6%	17.9%	

Chi-square value = 1.810

Comment: The prevalence of mild allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score <2) was higher among males compared to female. Likewise, the prevalence of severe allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score <4) was higher among males compared to female. The prevalence of moderate allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score from 2 to 4) was higher among females compared to male. The difference in proportion of allergic rhinitis among genders was not statistically significant by chi-square test (p-value = 1.810).

Figure 19: Association between gender and Modified Lund Kennedy Endoscopy Score by Chi-square test

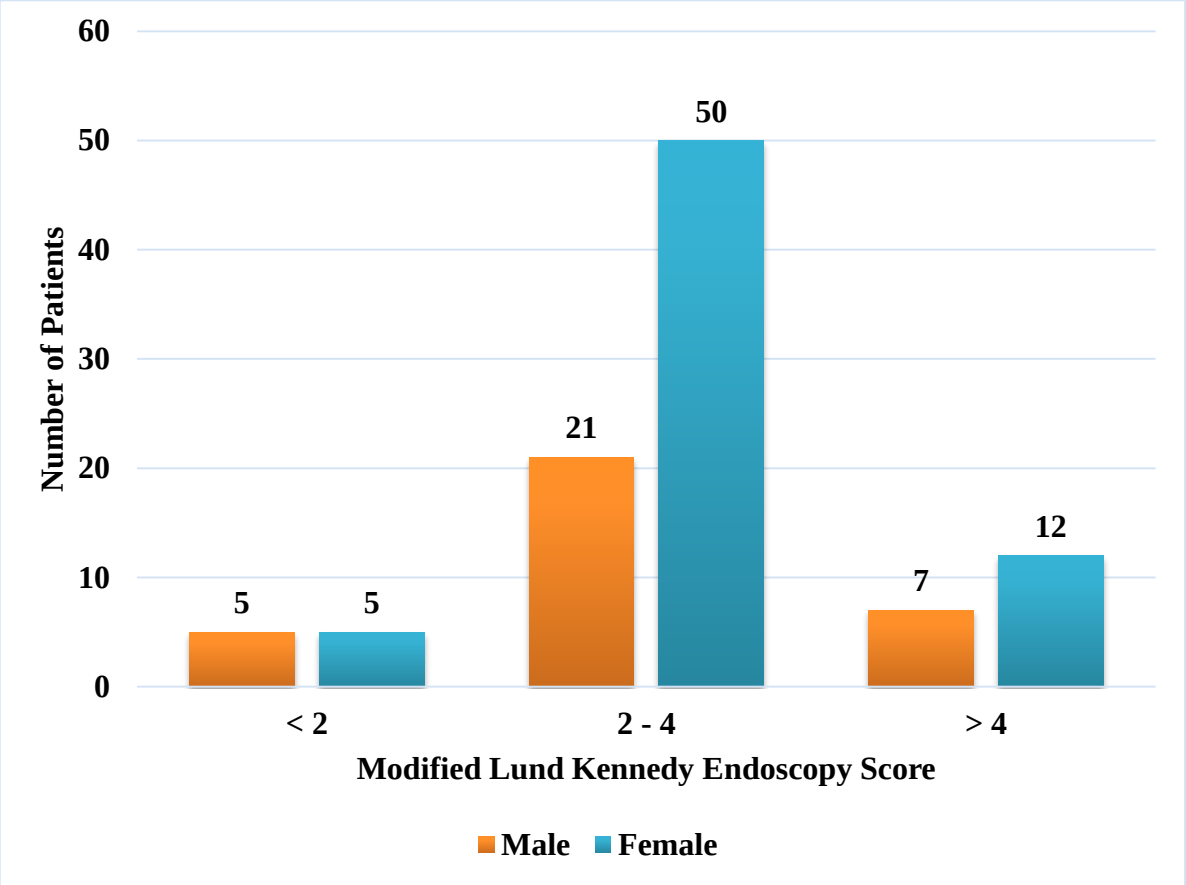


Table 23: Association between occupation and Modified Lund Kennedy Endoscopy Score by Chi-square test

Parameter		Modified Lund Kennedy Endoscopy Score			P-Value
		< 2 10/100	2 - 4 71/100	> 4 19/100	
Occupation	House Wife	4	32	10	0.561
		8.7%	69.6%	21.7%	
	Student	2	22	3	
		7.4%	81.5%	11.1%	
	Business	2	8	5	
		13.3%	53.3%	33.3%	
	Farmer	1	7	1	
		11.1%	77.8%	11.1%	
	Driver	1	2	0	
		33.3%	66.7%	0.0%	

Chi-square value = 6.780

Comment: The prevalence of mild allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score <2) was higher among drivers compared to other groups. Likewise, the prevalence of severe allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score <4) was higher among business people compared to other groups. The prevalence of moderate allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score from 2 to 4) was higher among students compared to other groups. The difference in proportion of allergic rhinitis among occupational groups was not statistically significant by chi-square test (p-value = 0.561).

Figure 20: Association between occupation and Modified Lund Kennedy Endoscopy Score by Chi-square test

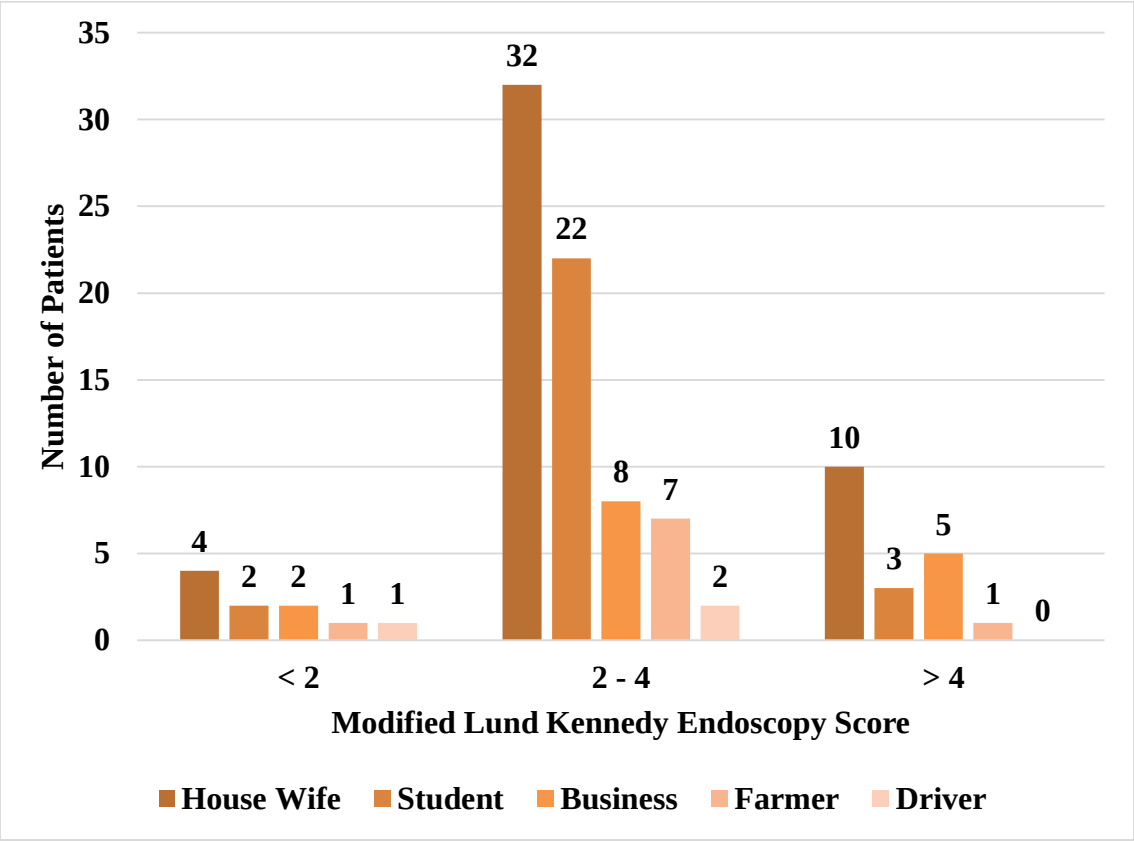


Table 24: Association between presenting symptoms and Modified Lund Kennedy Endoscopy Score by Chi-square test

Symptoms	Modified Lund Kennedy Endoscopy Score			P-Value
	< 2 10/100	2 - 4 71/100	> 4 19/100	
Nasal Obstruction	8	42	5	0.019
	14.5%	76.4%	9.1%	
Recurrent Sneezing	1	17	11	
	3.4%	58.6%	37.9%	
Running Nose	1	12	3	
	6.3%	75%	18.8%	

Chi-square value = 11.804

Comment: The prevalence of mild allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score <2) was higher among patients with nasal obstruction compared to other symptoms. Likewise, the prevalence of severe allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score <4) was higher among patients with nasal obstruction compared to other symptoms. The prevalence of moderate allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score from 2 to 4) was higher among patients with Recurrent Sneezing compared to other symptoms. The difference in proportion of allergic rhinitis among symptomatic patients was statistically significant by chi-square test (p-value = 0.019). In our study, the symptom score shows association with the Lund-Kennedy Endoscopic score.

Figure 21: Association between presenting symptoms and Modified Lund Kennedy Endoscopy Score by Chi-square test

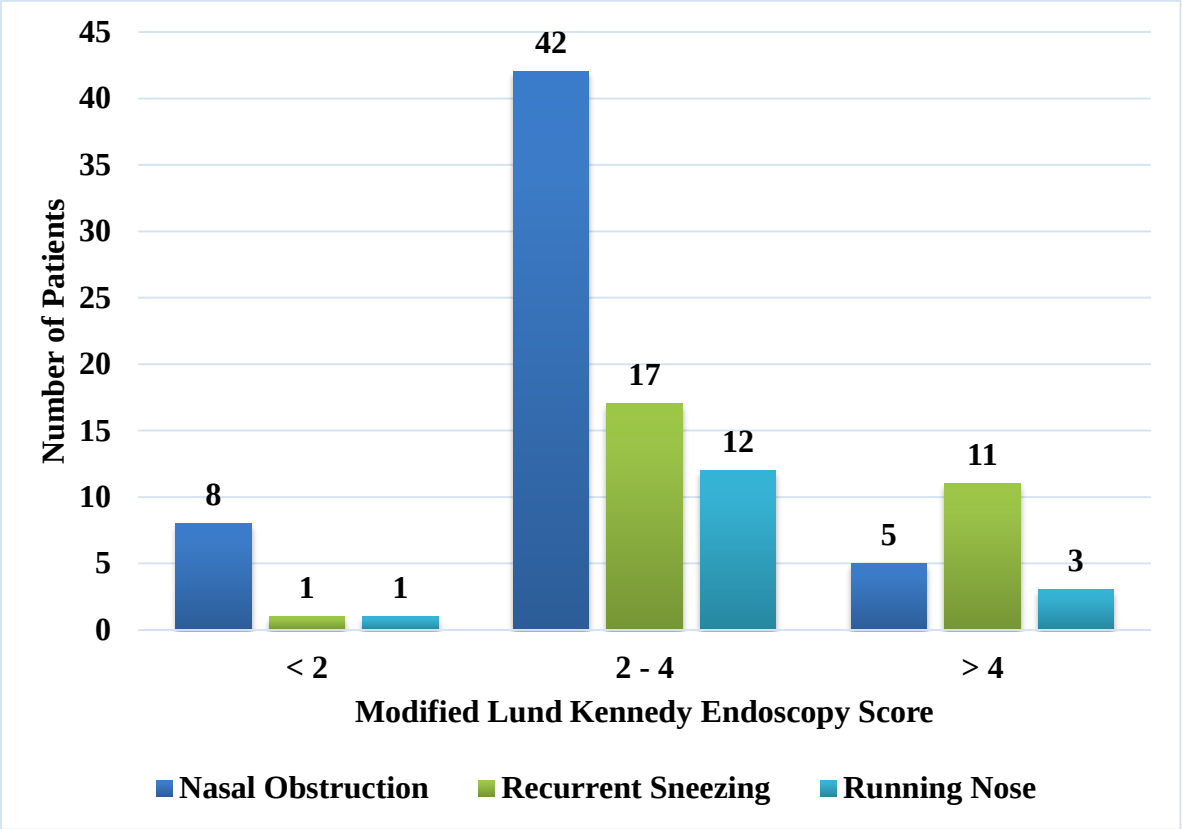


Table 25: Association between family history of allergic rhinitis and Modified Lund Kennedy Endoscopy Score by Chi-square test

Family History	Modified Lund Kennedy Endoscopy Score			P-Value
	< 2 10/100	2 - 4 71/100	> 4 19/100	
Absent	8	58	16	0.954
	9.8%	70.7%	19.5%	
Present	2	13	3	
	11.1%	72.2%	16.7%	

Chi-square test value = 0.095

Comment: The prevalence of mild allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score <2) was higher among patients with positive family history compared to another group. The prevalence of moderate allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score from 2 to 4) was higher among patients with positive family history compared to another group. Likewise, the prevalence of severe allergic rhinitis measured by Modified Lund Kennedy Endoscopy scale (score <4) was higher among patients with negative family history compared to another group. The difference in proportion of allergic rhinitis among genders was not statistically significant by chi-square test (p-value = 0.954).

Figure 22: Association between family history of allergic rhinitis and Modified Lund Kennedy Endoscopy Score by Chi-square test

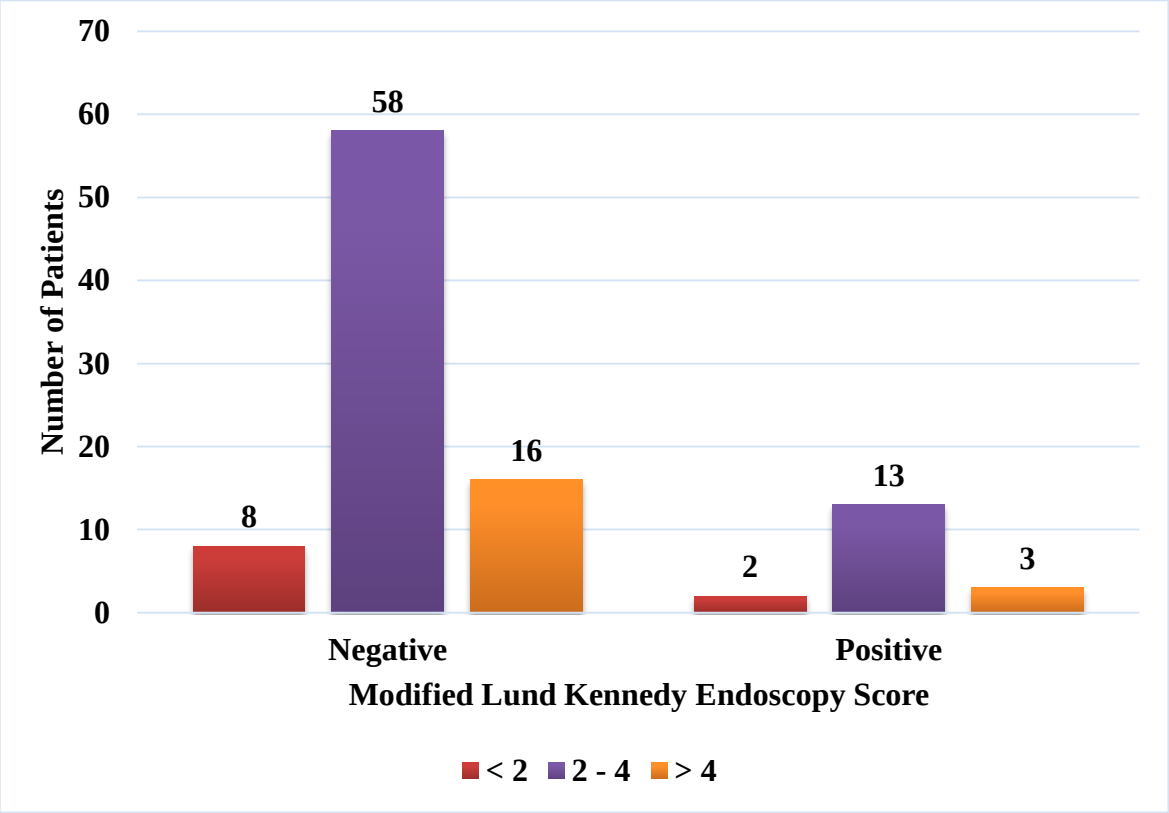


Table 26: Correlation matrix for Modified Lund Kennedy Endoscopy score and blood parameters in Allergic rhinitis

S.No	Modified Lund Kennedy Endoscopy score and blood parameters in Allergic rhinitis		DNE score	AEC	IGE
1	Modified Lund Kennedy Endoscopy score	Spearman's rho	1	0.439	0.915
		P-value		<0.001*	<0.001*
2	Absolute eosinophil count	Spearman's rho		1	0.485
		P-value			<0.001*
3	Immunoglobulin E level	Spearman's rho			1
		P-value			

*Correlation is significant at the 0.01 level (2-tailed)

Comment: By applying spearman's rank correlation it was found that there is a high positive correlation between the Modified Lund Kennedy Endoscopy total score and Absolute eosinophil count (p value = <0.001). And also observed that there is a high positive correlation between the Modified Lund Kennedy Endoscopy total score and Immunoglobulin E level (p value = <0.001).

Inference: The increase in Absolute eosinophil count is associated with increase in Modified Lund Kennedy Endoscopy total score and also the increase in Immunoglobulin E level is associated with increase in Modified Lund Kennedy Endoscopy total score.

DISCUSSION

The results of nasal endoscopy were scored using the Modified Lund Kennedy endoscopic scoring method in our study. Many authors have investigated the relationship between subjective symptoms and objective disease parameters in Allergic Rhinitis patients in order to develop a far less complicated, faster, less expensive, and more reliable method of making the correct diagnosis and selecting the appropriate treatment. The goal of this study was to see if there was a link between subjective symptom severity and AEC and IGE levels after a nasal endoscopy.

Nearly 13% of the patients in this study are between the ages of 11 and 20, 42% are between the ages of 21 and 30, 26% are between the ages of 31 and 40, 12% are between the ages of 41 and 50, and only 7% are between the ages of 51 and 60. This finding contrasts with that of Muddaiah et al[13], who found that patients with allergic rhinitis were most likely to be in the age category of 21-30 years (40%) followed by 31-40 years (26.9%), 11-20 years (16%), 41-50 years 13.10 percent, and 51-60 years (3.8 percent).

About 33% of the study subjects were male, with the remaining 67 percent being female, and this study can be compared to Baba Caliaperoumal[85] study, which found that 46% of patients were male and 54% were female. Due to differences in anatomic size, tobacco susceptibility, and hormonal factors, which have been suggested to raise overall vulnerability to AR in women compared to men, allergic rhinitis is significantly more prevalent in females. Due to smaller sinus Ostia, women may be more prone to blockage and infection.

Nearly 55% of the patients in this study had presenting complaints of nasal blockage; 29% of the patients had presenting complaints of recurrent sneezing; and only 16% of the patients had presenting complaints of runny nose. However, according to Muddaiah et al[13] the

most prevalent presenting complaint in patients with allergic rhinitis was running nose (90 percent), followed by nasal obstruction (85 percent), itching, and sneezing paroxysms (76 percent). In the study conducted by Nathan et al[82] showed Nasal blockage was reported by the majority of patients (71 or 88.75 percent), while nasal discharge was reported by 58 (72.50 percent).

Nearly 18% of the individuals in this study had a family history of allergic rhinitis. In the study by Muddaiah et al[13], however, a family history of allergy was found in 40% of the participants.

The symptom score correlates with the Lund-Kennedy Endoscopic score (p value: 0.019) in our study, as demonstrated by the chi-square test. A similar finding was made by Baba Caliaperoumal[85], who found that the symptom score had a moderate correlation with the Lund-Kennedy Endoscopic score (r=0.643, p0.001), which is similar to Tomassen et al[86]., who discovered that symptom-based CRS was statistically associated with positive endoscopy findings.

The mean Absolute Eosinophil Count of the study participants was 340.22 182.07, with a range of 100 to 1200. However, in a study conducted by Srivastava et al[84], the pre-therapeutic average value of serum AEC for the sample population was 475.9 cells/mm3.

The study participants' mean Immunoglobulin E levels were 1239.25 1238.21, with a range of 47 to 4560. In the study conducted by Srivastava et al[84]., however, the mean value of serum IgE for the study population pre-therapeutically was 322.21 IU/ml.

Employing reliability analysis in SPSS, the internal validity of using Modified Lund Kennedy Endoscopy findings in this study was investigated. The Cronbach's alpha score for the total score of the Modified Lund Kennedy Endoscopy scale and if any of the items were removed was 0.764, which is higher than 0.7. (good consistency). In several investigations, the

Modified Modified Lund Kennedy Endoscopy scale was used to measure localised abnormalities such as polyps, pathological discharges, and the state of the nasal mucosa. Endoscopy and CT results in CRS were correlated in a research by Goel et al.,[87] With a 95 percent confidence interval, this study has a sensitivity of 76.47 percent and a high specificity of 92.86 percent. Even though the CT scan gave a better sense of the state of the PNS and the osteomeatal complex, the study determined that endoscopy was superior for the assessment of localised disorders such as polyps, abnormal secretion, and the condition of the mucosa.

When analysing the assessment of chronic rhinosinusitis based on clinical criteria and endoscopy, Bhattacharyya and Lee found that adding DNE to the AAOHNS symptom-based guidelines for CRS enhanced diagnostic accuracy.[88] According to a recent meta-analysis conducted by Kim et al. to investigate the utility of nasal endoscopy for detecting CRS, nasal endoscopy might diagnose CRS patients with qualitative accuracy when compared to CT. When CRS was linked to a Lund–Kennedy score of 2 or above, nasal endoscopy had a higher diagnosis accuracy.[89]

The Modified Lund Kennedy Endoscopy total score and Absolute eosinophil count have a substantial positive association (p value = 0.001), according to spearman's rank correlation. It was also discovered that the Modified Lund Kennedy Endoscopy total score and (p value = 0.001) have a strong positive connection. As a result, an increase in Absolute eosinophil count is linked to an increase in Modified Lund Kennedy Endoscopy total score, as is an increase in Immunoglobulin E level linked to an increase in Modified Lund Kennedy Endoscopy total score.

Radiologic and endoscopic scoring systems have been the primary focus of outcomes research among objective markers of disease burden. Endoscopic scoring systems have undergone less scrutiny than radiologic scoring systems, which have been thoroughly

contrasted and validated. The LK method is still the most widely used and cited endoscopic grading system in rhinology outcomes research.

In the pre-operative examination of patients with chronic sinusitis, CT and nasal endoscopy are complementary. Despite the fact that CT scanning of the nose and PNS is the gold standard in the diagnosis of CRS, it is not commonly recommended in our facility due to expense and radiation exposure. As a result, it can be performed in patients who have positive symptoms and saved as a secondary study for patients who have negative endoscopic findings but become symptomatic after a period of time. A CT scan can be very useful in circumstances when navigating the endoscope beyond a certain point is difficult, such as when there is a gross deviation of the nasal septum, a paradoxical middle turbinate, or a concha bullosa. Another advantage of DNE is that, in the case of a pathological nasal mass, histology is critical for diagnosis, and DNE can assist in taking a precise biopsy to determine if the nasal tumour is benign or malignant. In treating nasal and nasopharyngeal diseases, as well as skull base surgeries, endoscopic directed treatments offer a high degree of accuracy due to vision regulated and incomparable guidance.

Even in patients with modest disease, many doctors depend heavily on CT when they believe treatment should not begin without imaging data. Repeated paranasal CT, on the other hand, is expensive and is connected with irradiation of the eye lenses and thyroid gland. The dose is equivalent to eight months of natural background radiation. Younger individuals with allergic rhinitis should be especially concerned about such exposure.[89]

Due to a lack of public awareness, restricted access to allergists, and confusing conditions such as the common cold, AR is frequently under-recognized. The diagnosis of AR can be determined based on the study results and a detailed history, which can be corroborated by examination findings with nasal endoscopy, such as the MLK scale, and, if necessary,

testing for allergen-specific IgE. Other tests, such as nasal allergen challenge, CT scans, measurement of nasal nitric oxide and ciliary beat frequency, nasal smears, nasal cultures, and analysis of nasal fluid for - transferrin) may be necessary to include or exclude distinct types of rhinitis if appropriate. According to the ARIA recommendations, AR can be classified as intermittent or persistent based on the length of symptoms, with persistent rhinitis lasting more than 4 days for a period of 4 weeks and as mild or moderate to severe, depending on whether sleep and daily activities are affected or whether symptoms are troublesome.

CONCLUSION

The average age of the study participants was 31.42 10.433, with a range of 11 to 57 years. Males made up about 33% of the study participants, while females made up the remaining 67%. The mean Absolute Eosinophil Count of the study participants was 340.22 182.07, with a range of 100 to 1200. The study participants' average Immunoglobulin levels were 1239.25 1238.21, with a range of 47 to 4560. The most common complaint was nasal blockage.

Cronbach's alpha score for the total score of the Modified Lund Kennedy Endoscopy finding and if any of the items were eliminated was 0.764, which is higher than 0.7. (good consistency). This scale has been proven to be reliable for data collection. The Modified Lund Kennedy Endoscopy total score has a high positive association with Absolute eosinophil count and Immunoglobulin E level, according to spearman's rank correlation.

The higher variability in Allergic rhinitis scoring attributed to the MLK system's improved dependability over the LK system. Although various other endoscopic scoring systems have been proposed to replace the Lund-Kennedy scoring system in order to increase reliability and clinical correlation, the MLK system appears to meet these goals. The MLK method may be well suited for use in both clinical practise and outcomes research due to its ease of use, applicability to patients regardless of surgery status, and improved correlations with AEC and IGE level.

RECOMMENDATIONS

This study suggests that nasal endoscopy be utilised as an early diagnostic technique for suspected Allergic rhinitis patients (based on diagnostic symptom criteria), particularly in hospitals with limited resources, high patient loads, and limited healthcare budgets. DNE, namely the Modified Lund Kennedy system, aids in reducing CT usage, lowering costs and reducing radiation exposure. As a result, we can diagnose and treat most patients with allergic rhinitis based on symptoms and DNE findings. Although CT is a more favourable tool for diagnosing the proper extent of the disease, the implicated sinuses, and the severity of the disease in each sinus in specialty care centres with CT availability. Despite maximum treatment, computed tomography may be added in patients with anatomical problems impairing endoscopic visibility, patients scheduled for surgery, and those with refractory disease.

LIMITATIONS

- Because the sample was selected from hospital patients, the results cannot be applied to the entire population.
- This is an observational study; a more experimental design with a Randomized Controlled Trial would allow for a more accurate comparison.
- There is no control or comparison group with other types of DNE scoring tools such as the Lund-Mckay score, DIP, and so on.
- The sample size is rather small.
- Many variables (e.g., smoking history, allergies, co-morbidities, quality of life, treatment) that could have influenced our patients' outcomes were not included in this study.
- Only blood samples were taken, when nasal smears would have provided a more accurate result.

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CASE PROFORMA

NAME: CASE NO. :

AGE : OP. NO. :

SEX : PHONE NO :

OCCUPATION :

ADDRESS :

DATE OF VISIT :

PRESENTING COMPLAINTS: 1.

2.

3.

FAMILY HISTORY:

EXAMINATION OF NOSE:

Examination of external nasal framework:

Anterior Rhinoscopy:

Mucosa

Septum

Lateral wall

Floor

Roof

INVESTIGATIONS:

Blood investigations:

1. Absolute Eosinophil count

2. Serum IgE

DIAGNOSTIC NASAL ENDOSCOPY:

	RIGHT	**LEFT**
FIRST PASS		
NLD opening		
Ridges and Spicules		
Eustachian tube opening		
Nasopharynx		
Chonae		
SECOND PASS		
Head of MT		
Uncinate process &Bulla		
Frontal recess		
THIRD PASS		
Sphenoethmoid recess		
Superior turbinate		
Superior meatus		

MODIFIED LUND -KENNEDY ENDOSCOPY SCORE

	0	1	2
Color	Pink/Normal	Pale	Bluish
Edema	Absent	Mild	Severe
Discharge	Absent	Clear thin discharge	Purulent
Polyp	Absent	Only in MM	Beyond MM

ANALYSIS

INVESTIGATIONS	REPORTS
AEC	
IgE	
DNE	

CONSENT FORM I

PARTICIPANTS CONSENT FORM

Participants Name:

Address:

Title of the Project: CORRELATION OF AEC & IgE WITH DNE IN ALLERGIC RHINITIS PATIENTS

The details of the study have been provided to me in writing and explained to me in my own language. I confirm that I have understood the above study and had the opportunity to ask questions. I understand that our participation in the study is voluntary and that we are free to withdraw at any time, without giving any reason, without the medical care given to us by the hospital being affected. I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s). I have been given an information sheet giving details of the study. I fully consent to participate in the above study.

Name & signature of the investigator **Name and signature of participant**

Date:

Date:

Name and signature of witness:

Date:

CONSENT FORM II

பங்கேற்பாளர்கள் CONSENT FORM

பங்கேற்பாளர்களின்பெயர்:

முகவரி:

திட்டத்தின் தலைப்பு: **அலெர்ஜிக்ரினிடிஸில்** DNE **உடன்** AEC & IgE **ஐ இணைத்தல்**

படிப்புபேவின் விவரங்கள் எனக்கு எழுத்துப் பூர்வமாக வழங்கப்பட்டு என் சொந்த மொழியில் எனக்கு விளக்கப்பட்டன. மேற்கண்ட ஆய்வை நான் புரிந்துகொண்டேன், கேள்விகளைக் கேட்க வாய்ப்பு கிடைத்தது என்பதை உறுதிப்படுத்துகிறேன். ஆய்வில் நாங்கள் பங்கேற்பது தன்னார்வமானது என்பதையும், எந்த காரணத்தையும் தெரிவிக்காமல், மருத்துவமனையால் எங்களுக்கு வழங்கப்பட்ட மருத்துவ கவனிப்பு இல்லாமல், எந்த நேரத்திலும் நாங்கள் திரும்பப் பெற சுதந்திரமாக இருக்கிறோம் என்பதையும் நான் புரிந்து கொள்கிறேன். இந்த பயன்பாடு விஞ்ஞான நோக்கங்களுக்காக மட்டுமே வழங்கப்பட்டால், இந்த ஆய்வில் எழும் எந்தவொரு தரவு அல்லது முடிவுகளின் பயன்பாட்டை கட்டுப்படுத்த வேண்டாம் என்று நான் நினைக்கிறேன்).

மேற்கண்ட ஆய்வில் தூய்மைப்படுத்த நான் முழுமையாக ஒப்புக் கொண்ட ஆய்வின் விவரங்களைத் தரும் ஒரு தகவல் தாள் எனக்கு வழங்கப்பட்டுள்ளது

சாட்சியின் பெயர் மற்றும் கையொப்பம்: **தேதி:**

பங்கேற்பாளரின் பெயர் மற்றும் கையொப்பம் தேதி:

MASTER CHART

AGE	SEX	OCCUPATION	C/O	FAMILY	COLOR	EDEMA	DISCHARGE	POLYP	DNE	AEC	IGE
40	1	5	1	1	1	0	0	0	1	300	66
27	1	3	1	0	1	0	0	0	1	200	107
27	1	4	1	0	1	0	0	0	1	307	184
31	2	1	2	1	1	1	0	0	2	500	412
25	2	1	1	1	1	0	0	0	1	300	157
42	2	1	2	0	1	1	0	0	2	300	500
17	1	2	3	1	2	1	1	1	5	1200	3353
35	2	1	1	1	1	1	1	0	3	500	1978
43	2	1	2	0	1	0	0	0	1	300	200
38	2	1	3	0	1	0	0	0	1	300	90
20	2	2	2	1	1	1	0	0	2	500	504
64	1	3	1	0	1	0	0	0	1	200	472
22	2	2	1	1	2	1	1	0	4	900	1924
26	1	2	1	0	1	1	0	0	2	100	1417
23	2	2	1	0	1	0	0	0	1	300	190
30	2	1	1	0	1	0	0	0	1	400	282
30	2	1	2	1	1	1	0	0	2	200	968
36	2	1	1	1	1	1	1	0	3	400	1536
24	2	1	2	0	1	1	0	0	2	400	722
18	1	2	1	0	1	0	0	0	1	200	108
33	1	3	2	1	2	1	1	1	5	400	4210
34	2	1	1	0	1	1	0	0	2	400	520
33	2	1	3	0	1	1	0	0	2	450	500
23	1	2	1	0	1	1	0	0	2	300	450
35	2	1	2	0	1	1	0	0	2	200	400
32	2	1	1	0	1	1	0	0	2	200	212
20	2	2	2	0	1	1	1	0	3	100	1218
25	1	3	1	0	2	1	1	1	5	500	2089
20	2	2	1	0	1	1	0	0	2	500	239
57	1	4	2	0	1	1	1	0	3	500	1550
20	2	2	1	0	2	1	1	0	4	800	1666

16	2	2	3	0	1	1	0	0	2	300	500
25	2	1	1	1	2	1	1	0	4	300	1353
45	1	4	1	0	1	1	0	0	2	200	462
30	2	1	3	0	1	1	0	0	2	300	450
41	2	1	1	0	1	1	0	0	2	500	324
21	2	2	1	0	1	1	0	0	2	400	385
21	2	2	3	0	1	1	0	0	2	400	600
11	2	2	1	0	1	1	0	0	2	300	47
49	2	1	1	0	1	1	0	0	2	100	89
40	2	1	1	0	1	1	0	0	2	300	500
20	2	2	3	0	1	1	0	0	2	500	600
26	2	1	2	0	2	1	1	1	5	400	3181
32	1	4	1	0	1	1	0	1	2	200	400
43	2	1	2	0	2	1	1	0	5	200	4560
26	2	1	1	0	1	1	0	0	2	300	350
47	1	4	2	0	1	1	1	1	4	100	1185
36	1	3	1	0	1	1	0	0	2	100	250
28	2	1	2	0	2	1	1	1	5	200	2250
29	2	3	1	1	1	1	0	0	2	100	500
34	1	5	1	0	1	1	0	0	2	150	400
27	1	3	3	0	1	1	0	0	2	300	600
21	2	2	3	0	1	1	0	0	2	500	217
24	2	1	1	0	1	1	0	0	2	300	328
56	1	4	2	0	1	1	1	0	3	400	900
45	1	3	2	0	2	1	1	1	5	745	4500
23	2	1	2	0	2	1	1	1	5	600	3950
57	1	4	1	0	1	1	1	0	3	200	800
26	2	1	1	0	1	1	0	0	2	100	300
32	2	1	3	0	1	1	0	0	2	300	400
55	2	1	1	0	1	1	0	0	2	200	350
30	2	1	1	0	1	1	0	0	2	300	450
35	2	1	1	0	1	1	0	0	2	300	550
23	1	3	1	0	1	1	0	0	2	300	800
18	1	3	3	0	1	1	1	1	4	500	1500
33	2	1	2	0	2	1	1	1	5	200	2250
43	2	1	2	0	2	1	1	1	5	300	3500
30	2	1	2	0	2	1	1	0	4	200	2600
35	2	1	1	0	1	1	0	0	2	100	300

32	2	1	1	1	1	1	0	0	2	350	450
38	1	3	2	0	2	1	1	1	5	400	2150
29	2	1	1	0	1	1	1	1	4	600	1800
27	1	2	1	0	1	1	0	0	2	200	380
25	1	2	1	1	1	1	1	0	3	250	750
23	1	2	2	0	1	1	0	0	2	200	350
18	1	2	3	0	2	1	1	1	5	600	3600
29	1	5	3	0	2	1	1	0	4	300	1900
36	2	1	1	0	1	1	1	1	4	380	1800
46	2	1	1	1	1	1	1	0	3	300	900
55	2	1	2	1	1	1	1	1	4	400	1700
40	2	3	1	0	1	1	0	0	2	200	400
38	2	1	1	0	1	1	0	0	2	100	400
22	2	2	1	0	1	1	1	0	3	320	1050
21	2	2	3	0	1	1	1	1	4	400	2010
33	2	1	2	0	1	1	0	0	2	200	400
24	2	2	1	0	1	1	0	0	2	100	300
36	2	4	1	0	2	1	1	1	5	500	3900
29	2	1	1	0	2	1	1	1	5	400	2500
34	2	4	2	1	1	1	1	0	3	300	1500
27	2	3	2	0	2	1	1	2	5	500	4000
19	1	2	2	0	1	1	0	0	2	100	300
18	2	2	1	0	1	1	1	0	3	300	1010
25	2	1	1	1	2	1	1	1	5	600	4500
26	2	1	3	0	2	1	1	1	5	450	2900
22	1	2	1	0	1	1	1	0	3	360	1210
42	2	1	1	0	2	1	1	1	5	550	3850
50	1	3	2	0	1	1	1	0	3	310	1100
51	1	3	3	0	1	1	1	1	4	400	2010
27	2	1	1	0	1	1	0	0	2	100	300
27	1	2	2	0	2	1	1	2	5	500	3600