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Original Research Article

Study of IgE levels As Biomarker in Bronchial Asthma Patients in Madhya Pradesh

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Conflict of interest: Nil

Abstract:

Background: Bronchial asthma is increasing day by day due to urbanization, air pollution, and the toxicity of tobacco. Serum IgE levels are also associated with the degree of air flow obstruction. Hence, IgE levels are directly proportional to airflow obstruction.

Methods: 80 (eighty) bronchial asthma patients aged between 20 to 55 years were studied. The hematological examinations were ESR, CBC, AEC, sputum for AFB, gram stains, chest x-ray, and ECG. Estimation of IgE was done by using Quantia IgE, which is a turbid metric immunoassay for human use, and spirometry was used in every patient and compared with levels of IgE in different age groups and both sexes.

Results: Clinical manifestations were: 34 (42.5%) dyspnea, 20 (32.5%) coughs, 20 (25%) wheezing, 14 (17.5%) had (100–200) IgE, 16 (20%) had (201–300) IgE, 20 (25%) had (301–400) IgE, and 30 (37.5%) had (400–500) IgE.

As per the FEV1 parameters, 15 patients were mild, 16 were moderate, and 49 were severe. Distribution of IgE (IU/m) as per age: 21–30 years old were 21 with 363 mean IgE/IU/ml. 31–40 were 17 with 384 mean IgE, 41–50 years were 23 with 368.2 mean IgE, and 51–55 years were 19 with 389.8 mean IgE.

Conclusion: The study of IgE levels and spirometry is an ideal technique to rule out the severity of bronchial asthma and can be treated efficiently to avoid morbidity and mortality in bronchial asthma patients.

Keywords: quantitative, IgE, spirometry, FEV_1, turbimetric, Madhya Pradesh.

Introduction

Asthma is increasing day by day due to urbanization, i.e., industrial smoke, smoke from vehicles, and tobacco smoke [1]. Asthma impact is manifested in patients, their families, and the community as a whole in terms of employment and school days. poor quality of life and frequent visits to the emergency department [2]. The prevalence of asthma ranges from 1% to 18% globally, as of 2009, and deaths reported due to asthma were 250,000 [3]. Asthma is defined as a chronic inflammatory disorder of the airway in which many cells and cellular elements play a vital role. The chronic inflammation is associated with airway hyper responsiveness, which leads to recurrent episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or early in the morning. These episodes are usually associated with widespread but variable airflow obstruction within the lung that is often reversible either spontaneously or with treatment. About 2–8% of bronchial asthma patients were reported in India. There are two types of asthma: extrinsic and intrinsic, based on the presence of allergies.

Allergic asthma patients have hyper responsive airways due to sensitization to inhaled antigens and chemical antigens. These stimulate the induction of TH2-type T cells, which release cytokines like IL-4 and IL-5. The related cytokines in turn promote IgE production by B cells, the growth of most cells (IL-4), and the growth and activation of eosinophils. The subsequent IgE mediator reaction to inhaled allergens elicits acute and late-phase reactions. IgE has also been shown to be a major contributing factor in the development of bronchial hyper responsiveness in asthmatics.

Spirometry is an ideal standard method for the diagnosis of bronchial asthma. Forced expiratory volume in one second from spirometry is a reliable technique to diagnose airflow obstruction. Hence, an attempt was made to evaluate IgE in different age groups and on both sides.

Material and Method

80 (eighty) patients who regularly visited the department of pulmonary medicine at L. N. Medical College and the research center, Kolar Road, Bhopal-462042 (MP), were studied.

Inclusive criteria: patients having symptoms of bronchial asthma, i.e., breathlessness. Coughing, chest tightness, and wheezing were included in the study.

Exclusion criteria: patients below the age of 18, smokers, COPD, and pulmonary tuberculosis (PT). Immune-compromised patients were excluded from the study.

Method: A detailed history of each patient was noted (duration of asthma, frequency, severity of exacerbation, smoking history, family history, profession exposure to dust or smoke), and a chest-x-ray, CBC, ESR, sputum for AFB, and gram stains were done. A part of this spirometry, including reversibility testing, was performed (RMS Meds prior with transducer model number A00N 2003). FEV1 was recorded in each patient. Serum IgE was estimated by using Quantine IgE, which is a turbimetric immunoassay for the estimation of immunoglobulin IgE in human serum.

The duration of the study was from June 2022 to July 2023.

Statistical analysis: clinical manifestations, levels of IgE distribution, distribution of IgE on the basis of severity, and mean distribution were classified by percentage. The statistical analysis was done using SPSS software. The ratio of males and females was 2:1.

Observation and Results

Table-1: Clinical Manifestation of Bronchial Asthma Patients: 34 (42.5%) had dyspnoea, 26 (32.5%) had cough, 20 (25%) had wheeze.

Table-2: Classification of patients based on IGE (IU/ml) level – 14 (17.5%) 100–200, 16 (20%) 201–300, 20 (25%), 301–400, 30 (37.5%) 401–500.

Table-3: Comparison of IgE levels based on degrees of respiratory obstruction with FEV1 parameters

- Mild 5 (100-200), 2 (201-300), 3 (301-400), 5 (400-501).
- Moderate – 2 (100–200), 5 (201-300), 3 (301-400), 5 (400–500).
- Severe – 2 (100–200), 7 (201-300), 5 (301-400), 35 (401–500).

Table-4: Mean distribution of IgE (IU/MI) as per age: 21 (21–30 years) 363, 17 (31–40) 384, 23 (41–50) 368.2, 19 (51–55) 389.8.

Table 1: Clinical Manifestation of Bronchial asthma patients

Symptoms	No. of patients (80)	Percentage %
Dyspnoea	34	42.5
Cough	26	32.5
Wheeze	20	25

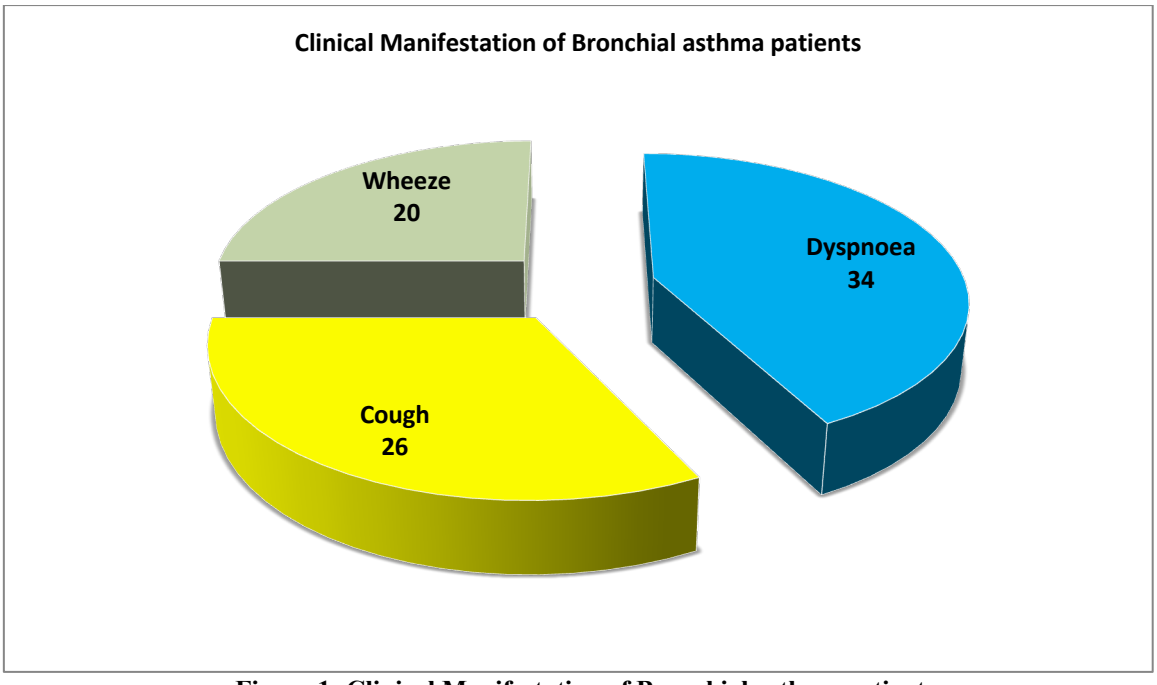

Figure 1: Clinical Manifestation of Bronchial asthma patient

Table 2: Classification of patients based on IgE levels

IGE (IU// ml)	No. of patients (80)	Percentage %
100-200	14	17.5
201-300	16	20
301-400	20	25
401-500	30	37.5

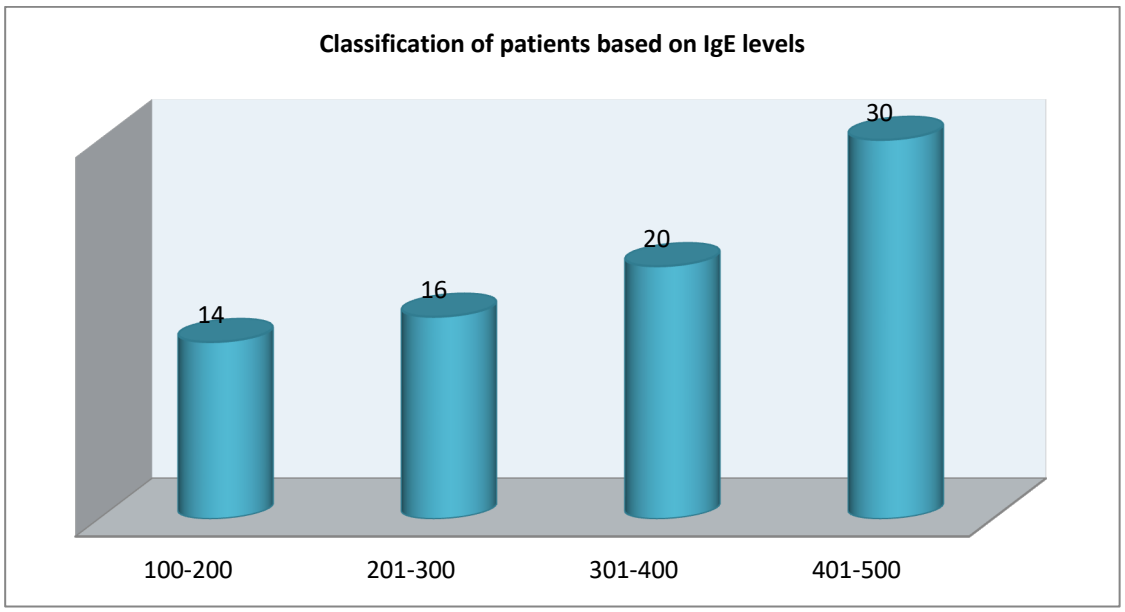

Figure 2: Classification of patients based on IgE levels

Table 3: Comparison of IgE levels based on degree of respiratory obstruction with FEV1 parameters

FEV1 Parameter	100 to 200	201 to 300	301 to 400	401 to 500
Mild	5	2	3	5
Moderate	2	5	5	4
Severe	2	7	5	35

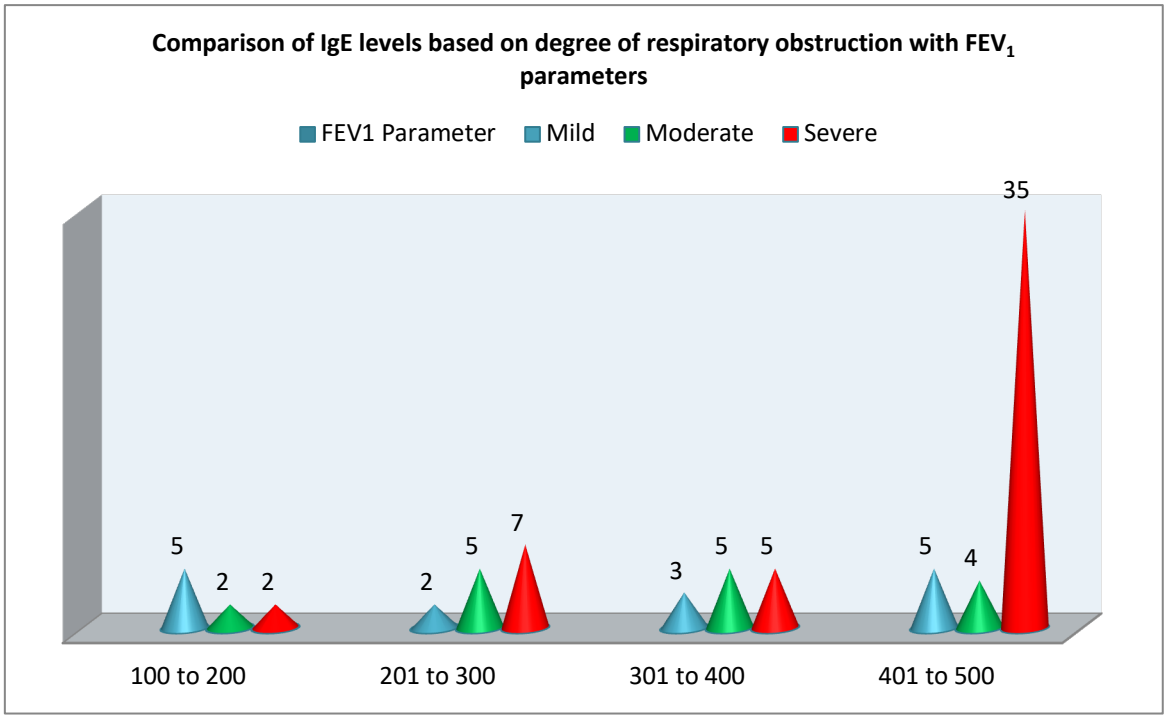

Figure 3: Comparison of IgE levels based on degree of respiratory obstruction with FEV_1 parameters

Table 4: Mean distribution of IgE (IU/Ml) as per the age

Age of the patients	No. of patient (80)	Mean IgE (IU/ml)
21-30	21	363
31-40	17	384
41-50	23	3682
51-55	19	389.8

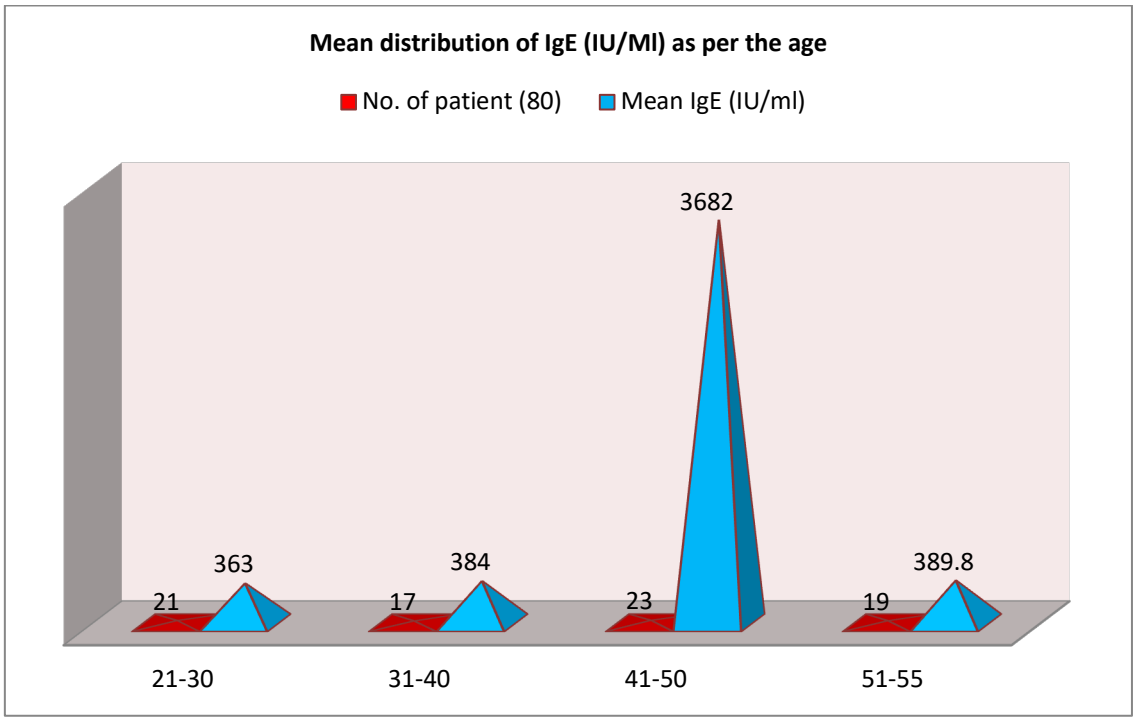

Figure 4: Mean distribution of IgE (IU/Ml) as per the age

Discussion

Present study of IgE level as biomarker in bronchial asthma of Madhya Pradesh population The clinical manifestations were that 34 (42.5%) had dyspnea, 26 (32.5%) had coughs, and 20 (25%) had wheezing (Table 1). 14 (17.5%) had 100–200 IgE levels, 16 (20%) had 201-300 IgE levels, 20 (25%) had 301–400 IgE levels, and 30 (37.5%) had 401–500 IgE levels (Table 2).

Comparison of IgE levels with a spirometer (FEV1) 15 were mild, 16 were moderate, and 49 were severe (Table 3). As per the distribution of age, 21 patients were 21–30 years old and had a 363 IgE (IU/ml) mean value; 17 patients were aged between 31 and 40 years old and had a 384 IgE (IU/ml); 23 patients were aged between 41-50 years old and had a 368.2 IgE (IU/ml); and 19 patients were aged between 51 and 55 years old and had a 389.8 IgE (IU/ml) mean value (Table 4). These findings were more or less in agreement with previous studies [5,6,7].

The quantity of IgE and the presence of allergen-specific IgE antibodies in the serum are both important biomarkers for defining the phenotype of a patient who presents with asthma symptoms [8]. The levels of IgE can also be useful in predicting persistent wheezing and its management. Detection of local IgE antibodies in the skin and tissue extracts may aid in adjudicating negative in vivo and serological measures of IgE antibodies despite clinical evidence of atopic asthma [9, 10].

The clinics can order specific IgE antibody tests for more than 200 individual allergen specificities, each of which corresponds to Dermatophagoides pteronyssinus (dust mite) [11]. Individually performed specific IgE tests have been classified as supplemental biomarkers because the participant's clinical history is needed to identify the target allergens for testing, and more than an IgE antibody test is generally needed to characterize a particular participant's sensitivities.

Summary and Conclusion

The present study of levels of IgE in bronchial asthma was very high compared with normal, although it was compared with a spirometric study. This study will be useful to predict the severity and prolongation of atopic asthma**.** The study found that the severity of asthma was higher at night compared to day, which could be because odema cells are more active at night**.** But this study

demands further genetic, hormonal, nutritional, pathophysiological, and environmental studies because the exact pathogenesis of bronchial asthma is still unclear.

Limitation of study – Owing to the tertiary location of the research centre, the small number of patients, and the lack of the latest techniques, we have limited findings and results.

This research paper was approved by the ethical committee of L. N. Medical College and the research centre at Kolar Road, Bhopal – 462042, Madhya Pradesh.

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