

Study of the Galectin-3 as a Biomarker for Assessment of Asthma

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Abstract: Asthma is a common chronic inflammatory disorder that causes reversible obstruction in the airways leading to hard breath and difficulty in the doing of the daily activities. It's multifactorial disorder effected by many biomarkers, one of this biomarkers is Gal -3. The present study aims to assessment of Galectin-3 as new biomarker and its role on developing of the asthma. In this research, a comparison was made between a group of asthmatic patients and a control group, with a total of fifty individuals in each category. Among the asthmatic patients, fifty appeared to be in good health, and their conditions were confirmed through consultations with specialists at Merjan Teaching Hospital in Hilla, Iraq. Upon examining the data, it was found that the serum Gal-3 levels in asthmatic patients were notably lower than those in the control group. Furthermore, it was observed that individuals with severe asthma had even lower levels of Gal-3 compared to those with mild asthma.

Keywords: Asthma, Galectin-3, Galectin, Gal-3.

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INTRODUCTION

Asthma is a heterogeneous disease represented by coughing, wheezing, narrowing of the chest and hard of breath [1]. Asthma tends to present as a lifelong circumstance, with different kinds of severity ranges throughout the bronchial asthma patient's existence [2]. Asthma impacts huge coordinate and circuitous financial costs. It is the most common chronic health condition in infancy. Asthma impact persons in several dissimilar habits: physically, psychologically, and socially [3]. Asthma response to inflammatory involve many cellular elements [4]. Eosinophilic asthma mechanism include enhancing cytokines of Th2 such as IL-4, IL-5, IL-9, and IL-13 by allergen [5]. he way non-eosinophilic asthma differs from eosinophilic asthma is significant. The form that involves neutrophils appears to be primarily influenced by infections and the activation of the body's basic defense mechanisms [6]. Galectin-3 plays a crucial role in the types of asthma that don't involve eosinophils [7]. Galectin-3 is a substance secreted by a type of immune cell called macrophages, possessing a 32 KD β -

galactoside binding lectin. It's recognized for its role in controlling the process of efferocytosis, a method of fighting off harmful cells [8]. Additionally, Galectin-3 is recognized as a protein that can bind to IgE [9]. This protein is associated with several aspects of asthma, including the attraction of eosinophils to the airways, changes in the structure of the airways due to eosinophil activity, the shift towards a Th2 immune response, and the upregulation of inflammatory substances [10]. This study focus on study the role of Gal-3 in Asthma diagnosis.

MATERIALS AND METHODS

Ethical Issues

The initiation of this project requires the endorsement of the logical board at the College of Medicine (University of Babylon/Iraq). The study's design and execution plan were explained to all participants. This approach to research, which follows the case-control study method, involved one hundred individuals, with fifty patients suffering from asthma

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visiting Merjan Medical City and fifty healthy individuals serving as controls. Each participant's body mass index (BMI) was calculated to assess their obesity level, using the formula $BMI = \text{weight (kg)} / \text{height (m)}^2$.

Pulmonary Function Test (PFT)

Pulmonary function test was measured for patients group and control group using Spirometer technique.

Determination of Human Galectin-3 (GAL-3)

Determination of serum GAL-3 level in asthmatic patients and control group were done by using Elabscience ELISA kit and according to the manufacturer manual.

RESULTS

There were no notable variations in average age and body mass index between asthmatic patients and the healthy control group. The age spread of asthmatic patients is depicted in Figure (1).

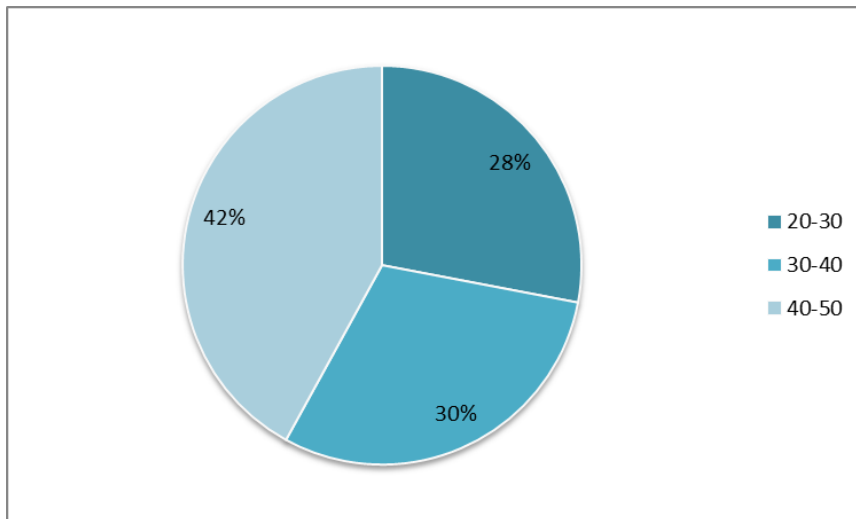


Figure 1: Age distribution for asthmatic patients

The distribution of BMI for asthmatic patients representing in Figure (2).

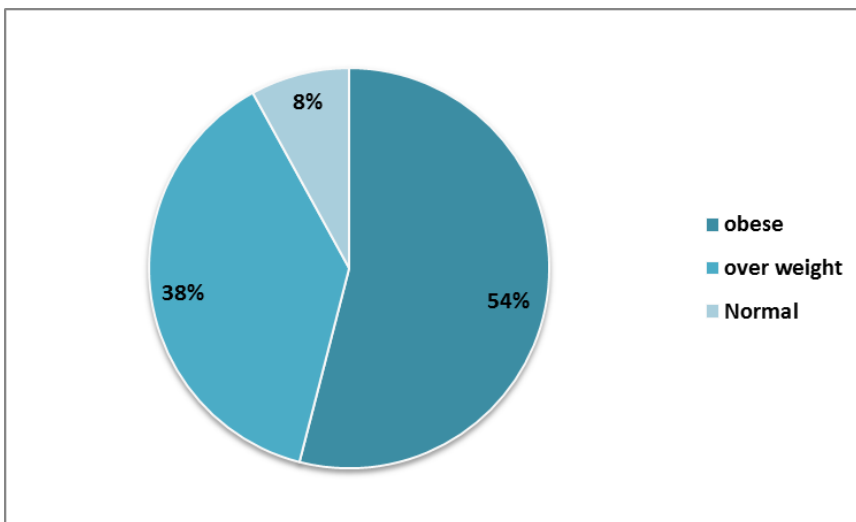


Figure 2: BMI distribution of asthmatic patients

The mean differences of Gal-3 in asthmatic patients and control group represented in Table 1.

Table 1: Mean Differences of Gal-3 Level According to Study Group

Group	NO.	Mean	SD	P-value
Asthma	50	1.5414	0.853713093	*
Control	50	13.7928	6.819412533	

*p value ≤ 0.05 was significant.

The mean and standard deviation for asthmatic group and control group were (1.5414pg/mL ± 0.853713093, 13.7928pg/mL ± 6.819412533) respectively.

According to the results of this study there were significant differences between means of Gal-3 level by study group. p value ≤ 0.05 was significant.

Serum level in asthmatic patients and control group show in Fig 3.

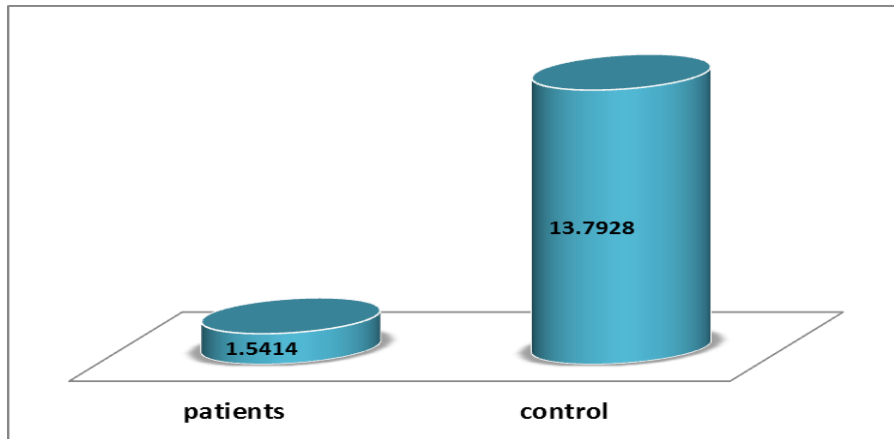


Figure 3: Serum level of GAL 3 in asthma group and control group

As it shown in Fig 3, the level of serum Gal-3 in asthmatic patients is lower than in control group.

The correlation between Gal-3 and severity of asthma show in figure (4).

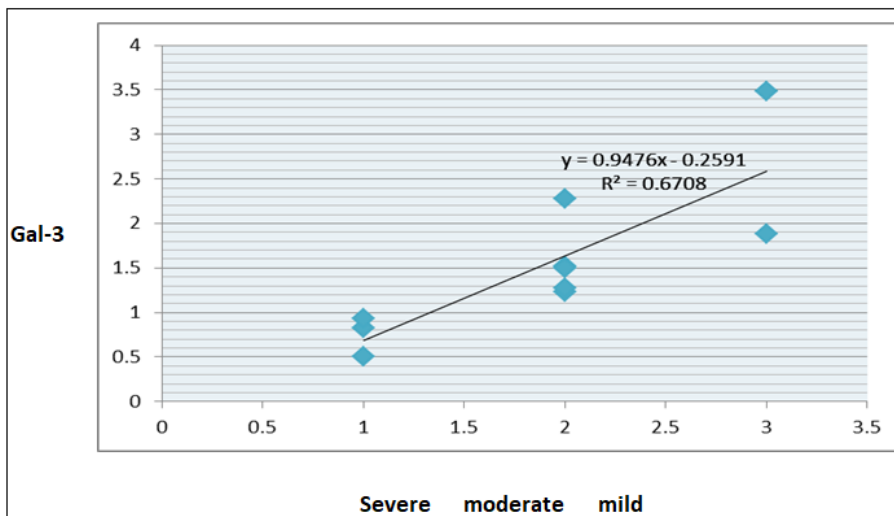


Figure 4: Correlation between Gal-3 and severity of asthma

DISCUSSION

Asthma is chronic disorder with various inflammatory biomarker, one of these marker which has a role in process of developing asthma is Galantin-3 which is protein has a role on IgE binding and act as anti-inflammatory and has role in signaling. The best measures for asthma is pulmonary function test [18]. A spirometer is a widely used test for evaluating lung function, measuring the volume of air a person can inhale and exhale fully, as well as the speed of air movement through the respiratory system [19]. This device assesses the combined performance of the lungs, chest muscles, and respiratory system by calculating the total amount of air expelled after a full breath, and the total lung capacity

(TLC) [20]. Galectin-3 is associated with the pathophysiology of several conditions including heart failure, rheumatoid arthritis (RA), juvenile idiopathic arthritis (JIA), Behçet’s disease (BD), cancer, and asthma [11]. The role of galectin-3 is crucial in controlling immune responses and inflammation. Galectin-3 acts as a pro-inflammatory molecule, with cells producing a significant amount of it in reaction to various inflammatory stimuli [12]. It is located on the surface of T-cells, which are part of the T-cell receptor (TCR) complex, and it appears to prevent T-cell activation from becoming excessive, thereby enhancing the regulation of TCR activity in T-cells [13]. It is also present in various cell types, including fibroblasts,

chondrocytes, osteoblasts, osteoclasts, keratinocytes, Schwann cells, and the lining of the stomach. Additionally, it is detected in endothelial cells across different tissues and immune cells like neutrophils, eosinophils, basophils, mast cells, Langerhans cells, and dendritic cells [14]. Several studies showed a high level of Gal-3 expression in triple-negative breast cancers, heart failure, Systemic sclerosis (SSc) [15-17]. In the present study Statistically significant differences were found in Gal-3 level between asthmatic patients and control group as a mean (1.5414, 13.7928) respectively, There were low levels of serum Gal-3 in asthmatic patients compared to control group. Low levels of Gal-3 were seen in severe asthma compared to mild asthma.

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