



Research Article

Assessment of serum levels of malondialdehyde and interleukine-5 in asthmatic patients receiving corticosteroid therapy

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Abstract

Asthma is a very common chronic disease involving the respiratory system in which the airways occasionally constrict, become inflamed, and are lined with excessive amounts of mucus, often in response to one or more triggers. The current work represents an experimental study that was conducted in Tikrit Teaching Hospital, during the period from April 2008 to the end of November 2008. Around 90 individuals were included in this study from both genders, their ages were from 18 to 80 years. A total of 70 patients with mild and moderate asthma were included in this study from both genders. Their age range from 18 -80 years. It is evident from this study that the highest percentage was 69.2% in patients with mild asthma on steroids was females and 52.6% in asthmatic patients without steroid therapy males, while in mild asthma without steroids and moderate asthma on steroids the percentage is the same in both genders and which was 37.5% and 50% respectively. There was no significant difference between different study groups regarding gender distribution ($P > 0.05$). The mean level of serum malondialdehyde was 3.39 ± 0.42 in mild asthma without steroid therapy, 4.03 ± 0.18 in moderate asthma without steroid therapy, 2.18 ± 0.12 in mild asthma on steroid therapy, while 2.77 ± 0.56 in moderate asthma on steroid therapy and 3.33 ± 0.16 in the control group. reveals that the mean level of serum interleukin-5 was 10.78 ± 3.19 in mild asthma without steroid therapy, 16.65 ± 4.99 pg/ml in moderate asthma without steroid therapy, 3.94 ± 0.82 pg/ml in mild asthma on steroid therapy, while 4.10 ± 1.08 pg/ml in moderate asthma on steroid therapy and 3.32 ± 0.38 pg/ml in the control group.

Keywords: Asthma, Mal9ndialdehyde, Interleukin-5, Corticosteroids

Introduction

Asthma is a very common chronic disease involving the respiratory system in which the airways occasionally constrict, become inflamed, and are lined with excessive amounts of mucus, often in response to one or more triggers. Asthma is characterized by paroxysmal and reversible obstruction of the airways and it is increasingly understood as an inflammatory condition combined with bronchial hyper-responsiveness. Triggers unleash an inflammatory cascade within the bronchial tree leading to the typical symptoms of asthma e.g. wheez, shortness of breath, chest tightness, and cough (Network, 2018). The airway inflammation underlying asthma is regulated by a network of mutually interacting cytokines. The exact functional role of each individual cytokine in the pathogenesis of the disease remains to be fully established. Type 2 T-helper cells are currently considered to play a crucial

role in this process. The potential role of type 2 T-helper cell-cytokines in asthma is increasingly being recognized. In particular, IL-4, IL-5, and -13 (Stanojevic et al., 2012). Like interleukin-4, interleukin-5 is produced by Th2 lymphocytes but not the Th1 subset. By virtue of the pattern of cytokines that they synthesize, Th2 cells are thought to control the growth and effector function of those cell types that are involved in allergic inflammatory responses (Pavord et al., 2017; Ellwood et al., 2005).

Patients, Materials, and Methods

The current work represents an experimental study that was conducted in Tikrit Teaching Hospital, during the period from April 2008 to the end of November 2008. Around 90 individuals were included in this study from both genders, their ages were from 18 to 80 years. A total of 70 patients with mild and moderate asthma were included in this study from both genders. Their age range from 18 -80 years. All patients

presented with signs and symptoms of asthma, and they had been checked for their age, and the severity of the disease (mild or moderate). The patients were divided into two main groups according to their clinical presentation, and history. First group consist of 35 asthmatic patients without steroid therapy (16 male and 19 female), the second group consist of 35 patients presented with asthma on steroid therapy (15 male and 20 female). Forty apparently healthy individuals of both gender matched with patient age, sex and ethnicity were used as control group in this study, A detailed history of asthma and atopic disease in their families were questioned. The entire control group had normal pulmonary function test. The control subjects with positive findings were all excluded.

The exclusion criteria in this study includes the followings:

1. Patients with diabetes mellitus.
2. Patients with chronic obstructive pulmonary disease.
3. Patients with hyperthyroidism.
4. Those with mental retardation.
5. Patients with severe asthma.
6. Pregnant women.
7. The smokers.
8. The uncooperative patients.

The diagnosis of asthma is made on the basis of compatible clinical history combined with $\geq 20\%$ improvement in PEFR 15 minutes after inhalation of short acting bronchodilator. Full history was taken including name, age, sex, address, occupation, detailed history of asthma, including asthma symptoms, asthma treatment and control, family history of asthma and other atopic disease, drug allergy, food allergy, relieving factors, aggravating factors and history of associated allergic disease. Careful physical examination was performed for every patient to identify the disease, which include general examination, and chest examination. Measurement of height, weight, and peak expiratory flow rate (PEFR) by a portable

peak flow meter (ASTRA) by asking the patient to take deep inspiration then press his or her mouth tightly to the inlet of the device then through maximum forcible, fast expiration in as much as possible. Such a method was repeated three times and we have taken the value and compared it to the predicted average normal PEFR (liter/minute) to sure that the patient had mild to moderate asthma according to the classification of asthma severity [Table 3](#).

Alcohol 70% is used to sterilize the area of blood aspiration from the basaltic vein in the anticubital fossa. Two mls of blood sample was collected from each patient and controlled by using disposable syringes and transferred immediately to plain tubes, the venous blood was allowed to clot, and was centrifuged at 3000 rpm for 15 minutes, and the serum was then removed to another plain tube and stored at -20°C until the time of analysis, a sample showing hemolysis was discarded ([Angkasekwinai et al., 2017](#)). Serum was used for the estimation of IL5, and MDA ([Busse et al., 2013](#)).

All common laboratory chemicals and reagents used in this study were of annular grade unless otherwise specified, and were obtained from the following companies:

A. Fluka Company, UK: NaOH, methanol, Butyl acetate, n-Butanol, and chloroform.

B. RDH Company, Germany: orcinol HCL, and TBA.

C. Riedel-Deherform Company: phosphotungstic acid and periodic acid.

D. Sigma Chemical Company. NANA

The result was arranged in figures and tables and given as mean \pm SD. Values and data were analyzed using SPSS version 11, The difference between the study's groups was tested by using a student t-test. Any $P < 0.05$ was considered statistically significant, while any P value of more than 0.05 was considered statically non-significant.

Results & Discussion

The ages of the patients and the control were arranged to

Table 1. Age distribution in different study groups

Age	Group										Total	
	Mild asthma without steroid		Moderate asthma without steroid		Mild asthma on steroid		Moderate asthma on steroid		Control			
	No	%	No	%	No	%	No	%	No	%	No	%
< 20	2	13	0	0	2	15.4	1	4.55	1	5	6	6.67
21 – 30	9	56	7	37	2	15.4	5	22.7	9	45	32	35.6
31 – 40	0	0	5	26	5	38.5	4	18.2	9	45	23	25.6
41 – 50	3	19	4	21	2	15.4	4	18.2	1	5	14	15.6
51 – 60	1	6.3	1	5.3	2	15.4	6	27.3	0	0	10	11.1
> 60	1	6.3	2	11	0	0	2	9.09	0	0	5	5.56
Total	16	100	19	100	13	100	22	100	20	100	90	100

subgroups and the number of the patients with mild and moderate asthma on steroid therapy were illustrated in the following table.

The gender of the patients and the control were arranged according to the number of the males and females and their percentage. It is evident from this study that the highest

percentage was 69.2% in patients with mild asthma on steroid was females and 52.6% in asthmatic patients without steroid therapy was males, while in mild asthma without steroid and moderate asthma on steroid the percentage is the same in both genders and which was 37.5% and 50% respectively. There was no significant difference between different study groups regarding gender distribution ($P > 0.05$).

Table 2. Gender distribution in different study groups.

Gender	Groups					Total
	Mild asthma without Steroid	Moderate asthma without steroid	Mild asthma on steroid	Moderate asthma on steroid	Control	
Male	6 (37.5%)	10 (52.6%)	4 (30.8%)	11 (50%)	12 (60%)	43 (47.8%)
Female	1 (37.5%)	9 (47.4%)	9 (69.2%)	11 (50%)	8 (60%)	47 (52.2%)
Total	16 (100%)	19 (100%)	13 (100%)	22 (100%)	20 (100%)	90 (100%)

Table 3. Occupational distribution in different study groups

Occupation	Groups					Total
	Mild asthma without steroid	Moderate asthma without steroid	Mild asthma on steroid	Moderate asthma on steroid	Control	
Housewife	8 (50%)	9 (47.4%)	6 (46.2%)	9 (40.9%)	7 (35%)	39 (43.3%)
Student	1 (6.3%)	0 (0%)	2 (15.4%)	1 (4.5%)	1 (5%)	5 (5.6%)
Professional	6 (37.5%)	3 (15.8%)	3 (23.1%)	3 (13.6%)	10 (50%)	25 (27.8%)
Farmer	1 (6.3%)	3 (15.8%)	2 (15.4%)	4 (18.2%)	0 (0%)	10 (11.1%)
Business	0 (0%)	4 (21.1%)	0 (0%)	5 (22.7%)	2 (10%)	11 (12.2%)
Total	16 (100%)	19 (100%)	13 (100%)	22 (100%)	20 (100%)	90 (100%)

Concerning the occupation of the patients (Table 3) show that the highest percentage in different groups of the study was among housewife and the professional respectively then the other occupation (business, farmer, and student) with the lowest percentage respectively and there was no statistically significant difference among different study groups regarding occupation ($P > 0.05$).

Table 4 demonstrate that patients with mild asthma were 16 from urban area and 13 from rural area and patients with moderate asthma were 18 from urban area and 23 from rural area. There was no significant difference between the severity of asthma and the residence of patients ($P > 0.05$).

Table 4. Residence distribution in different study groups

Residence	Groups				Total
	Mild asthma without steroid	Moderate asthma without steroid	Mild asthma on steroid	Moderate asthma on steroid	
Urban	9 (56.3%)	8 (42.1%)	7 (53.9%)	10 (45.5%)	34 (48.6%)
Rural	7 (43.8%)	11 (57.9%)	6 (46.2%)	12 (54.5%)	36 (51.4%)
Total	16 (100%)	19 (100%)	13 (100%)	22 (100%)	70 (100%)

Table 5 shows that the mean level of serum malondialdehyde was 3.39 ± 0.42 in mild asthma without steroid therapy, 4.03 ± 0.18 in moderate asthma without steroid therapy, 2.18 ± 0.12

in mild asthma on steroid therapy, while 2.77 ± 0.56 in moderate asthma on steroid therapy and 3.33 ± 0.16 in the control group.

Table 5. Malondialdehyde (MDA) level in different study groups

Serum malondialdehyde ($\mu\text{mol/L}$)	Mild asthma without steroid	Moderate asthma without steroid	Mild asthma on steroid	Moderate asthma on steroid	Control
No	16	19	13	22	20
Range	1.40 – 6.17	0.62 – 7.03	1.73 – 4.10	2.02 – 4.21	2.33 – 6.33
Mean \pm SD	3.39 ± 0.42	4.03 ± 0.18	2.18 ± 0.12	2.77 ± 0.56	3.33 ± 0.16

Table 6 reveals that the mean level of serum interleukin-5 was 10.78 ± 3.19 in mild asthma without steroid therapy, 16.65 ± 4.99 pg/ml in moderate asthma without steroid therapy, 3.94

± 0.82 pg/ml in mild asthma on steroid therapy, while 4.10 ± 1.08 pg/ml in moderate asthma on steroid therapy and 3.32 ± 0.38 pg/ml in control group.

Table 6. Serum interleukin-5 levels in patients and control

Serum interleukin-5 (pg/ml)	Mild asthma without steroid	Moderate asthma without steroid	Mild asthma on steroid	Moderate asthma on steroid	Control
No	16	19	13	22	20
Range	6.80 – 14.31	8.21 – 15.63	2.39 – 8.02	3.07 – 7.24	1.35 – 6.41
Mean \pm SD	10.78 ± 3.19	16.65 ± 4.99	3.94 ± 0.82	4.10 ± 1.08	3.32 ± 0.38

Conclusions

From this study, we can conclude that steroid therapy in asthmatic patients plays an important role in attenuation of oxidative stress (malondialdehyde). It is evident from this study that steroid therapy in asthmatic patients suppress the serum level of IL₅. 1-A studies that concern with another inflammatory markers like IL₃, IL₄, IL₁₃ and TNF in asthmatic patients. Further study in asthmatic patients

receiving leukotrine receptor antagonist drugs (Montelukast, Zafirlukast) to evaluate their effect on different inflammatory markers. Further study in pediatric age groups to see and study the effect of steroid therapy. on different inflammatory markers and of them MDA and IL₅.

Conflict of Interest

The author hereby declares no conflict of interest.

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Ethical Considerations

The study was approved by the institutional ethical committee.

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