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The Immunological Role of Interleukin-17 in Male Rats Infected with Aspergillosis

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ABSTRACT

Background: Aspergillus sp. Most fungal abundant and the wider spread on the ground and these fungi are adapted with most of the citizen habitat And environmental centers nich Such as air, soil, plant remnants , tree leaves, and old rotting fruits, as well as garbage, sawdust, and stored grains such as wheat, barley, corn, animal feed , and organic fertilizer . They are found in most oxygen-rich environments. (Zulkifli, 2015) And types of genus *Aspergillus*Many majority of medical importance and some of which are economically important but species that are related to diseases with a not fake the clinicalclinically importance she*A. Terreus* , *A. fumigatus, A. flavus, A.nidulans, A. niger.*

Methods: The current study included isolation and phenotypic diagnosis of some opportunistic fungi from the lower respiratory tract of patients attending the Consultative Clinic for Respiratory and Chest Diseases in Dhi Qar Governorate) southern Iraq), where 154 sputum samples were collected.sputumFor the period from 1/10/2020 to 2/15/2021.

Aspergillosis was developed in rats after exposure to the fungus *Aspergillus fumigatus* For one time only, (75) white male rats were used, and they were divided into (5) groups and according to the following time periods: group (4, 8, 12, 16, 20 days) and an immunosuppressive (cyclosporine) was used according to the above groups.

Aim of Study: The study aimed to investigate the level of Interleukin 17 (Interleukin 17).IL17 (In the serum of rats infected with Aspergillosis and knowledge of the immune cycle.

Results: Immunological parameters were studied (IL17After infecting rats with Aspergillus disease, using cyclosporin and according to the study groups, where a significant increase in the concentration of Interleukin 17 was found in all groups treated with cyclosporine and mushrooms. *A.fumigatus* Compared to the control group, while the groups showed treatment with mushrooms *A.fumigatus* Only a significant increase, but to a lesser degree than (Af + cyclo (Compared to a control group.

The results showed a significant decrease for the total numberWBCs In the groups treated with cyclosporine and mushrooms *A.fumigatus* Compared to the control group for the time periods (4, 8, 12, and 16 days), while the groups showed treatment with fungi*A.fumigatus* Only a significant decrease, but to a lesser degree than the totals)Af + cycloCompared to the control group and for the time periods (4, 8, 12 days) compared to the control group.

Conclusion: This study concludes with high concentrations of interleukin 17 and other hematological factors in rats infected with Aspergillus.

Keywords: Immunological role, Interleukin-17, Male Rats, Aspergillosis

INTRODUCTION

Aspergillus genus is among the most abundant and widespread fungal species on earth, and these fungi are adapted to most of the citizen. habitat And environmental centers nich Such as air, soil, plant remnants, tree leaves, and old rotting fruits, as well as garbage, sawdust, and stored grains such as wheat, barley, corn, animal feed, and organic fertilizer. They are found in most oxygen-

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rich environments. (Zulkifli, 2015) Andtypes of genus *Aspergillus* Many are of great medical importance, and some of them are of economic importance, but the types that are related to diseases are of clinical importance clinically importance she*A. Terreus* , *A. fumigatus, A. flavus, A.nidulans, A. niger* (Kalogerakisa *et al* , 2005) .

(Samson et al, 2010) Explain that the identification that depends only on the morphological characteristics is not sufficient, especially to distinguish between the species that may exhibit a variation in the phenotype. The main purpose of the morphological characterization is to separate isolates into groups or sections of their own. Due to this limitation, molecular characterization using DNA sequencing has been incorporated to confirm species identity.

Interleukin -17

Interleukin-17(IL-17) A cytokine group, the Interleukin 17 family was first known in 1993 as copies of a rodent T-cell hybrid tumor (Rouvier *et al* , 1993)**And** founding member of a group of cytokines called family isIL-17 He also knows IL-17 Basim CTLA8 In rodents, interleukin-17 is a cytokine that acts as a powerful mediator in delayed reactions by increasing the production of chemokines in different tissues to recruit monocytes and neutrophil cells at the site of inflammation. Similar to interferon kama is produced IL-17Bo mode helper T cells(Kindt *et al* , 2007).It worksInterleukin 17 As a family, it is an inflammatory stimulant cytokine that responds to the invasion of the immune system by extracellular pathogens and leads to the destruction of the cellular structure of the pathogen and interleukin-17 works in concert with TNF and interleukin-1 (Chiricozzi *et al* , 2011; Miossec *et al* 2009) **And** relatedIL-17 Cell surface receptors of the first type are called IL-17R Of which there are at least three variables IL17RA And the IL17RB And the IL17RC (Starnes *et al* , 2002) And Jene IL-17 In humans, 1874 long base pairs of cells have been cloned CD4 + T And every member of a family IL-17 It has a distinctive pattern of cellular expression as that of expression IL-17A And the IL-17F Limited to a small group of activated T cells, they are upregulated during inflammation and are expressed IL-17B In many peripheral tissues, immune tissues are also regulated IL-17C To a high degree in inflammatory states, although the abundance of resting conditions is reduced, it is expressed IL-17D Significantly in the nervous and skeletal system while it exists IL-17E At low levels in various peripheral tissues (Aggarwal and Gurney, 2002). It contains the family of cytokines (17interleukin-17) IL-6 structurally related cytokines IL-17A Until IL-17F And the typical member of this family is IL-17A Although he does not know much about IL-17B-F except if IL-17A) Known as IL-17It has received much attention for its pro-inflammatory role in autoimmune diseases, yet it has become clear over the past decade that the functions of IL-17 Much more accurate than just turning on inflammation and accumulating evidence suggests that IL-17 It has important roles in maintaining health during response to injury, physiological stress, and infection (McGeachy *et al* , 2019(Stay though IL-17 Mysterious throughout the 1990s And in the early part of the twenty-first century many studies indicated Early indications that this cytokine were elevated in human inflammatory diseases or autoimmune diseases were expressed and produced by helper T cells. (Antonysamy *et al* , 1999; Infante-Duarte *et al* , 2000; Albanesi *et al* , 1999) It is a unique signaling protein from cells (T CD4)Which is called)Th17)He also has other sources which are cells)CD8 + T Cell)And neutrophils and eosinophils, and is also secreted by tumor killer cells NKT (Benchetrit *et al* , 2002) .

MATERIALS AND METHODS

Preparation of the fungal suspension solution

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The fungal clamp present from colonies of filamentous fungi (Aspergillus fumigatus)One week old and incubated at 25 ° C, which were collected from samples of infected patients from the Respiratory and Chest Diseases Center in Dhi Qar Governorate. Where a part of the colony was taken by meansloop Add it to a tube containing 5 ml of distilled water, then shake the tube to obtain a homogeneous fungal suspension whose turbidity was adjusted using a standard McFarland scale. Standard McFarland Scale Which is equal to tube No. (1) in the scale where the concentration of the fungus is equal to 3 x 108 cells / ml.

Experiment animals

I used 75 of the male laboratory rats of the type Albino rats In this study, where their ages ranged between 10-12 weeks and weighed between 150-135 gm, rats were obtained from the animal house of the College of Veterinary Medicine / University of Qadisiyah, where they were placed in plastic cages with 6 rats in each cage and the floor of the cages was furnished with sawdust, which was replaced Periodically, to keep the rats clean, and the animals were subjected to similar laboratory conditions in terms of ventilation and temperature 2 ± 22 ° C.ºAnd lighting (12 hours of light to 12 hours of darkness), and water and food were provided openly ad libitium As the bush was manufactured in the shape of fingers (Ward, 1970.(

Experience design

Use in it (75) Rats was divided into five groups, each group comprising 15 mice. The experiment continued(20)One day, the rats (five mice per group) were injected with a lassiclosporin immunosuppressant in an amount of) 10Amalgam) and for one time Then the rats were dosed with plankton fungi *A.fumigatus* 3) x 108 cells / ml) compared to McFarland's solution, at an amount of (100 µl) (any concentration)1,0Ml) for each (ten rats i.e. five immunosuppressed rats and five non- immunosuppressed rats, except for the control group (Through the trachea trachea By (syringe) and for one time The animals were distributed as follows:

1. Control group: It was injected with the physiological solution Nacl 0.9, With 0.1 ml in the posterior right plantar peritoneum, on the first and third day of the experiment, a control group returned with 25 rats.
2. First Transaction Group (T1 :(On the fourth day was anesthetized rats , and the withdrawal of blood from the heart directly and were then sacrificed animals and the anatomy of and taking full lung.
3. Second Transaction Group (T2 :(Also on the eighth day, the animal was anesthetized, blood was drawn from the heart directly, then it was autopsy, and the whole lung was taken.
4. Third transaction group (T3 :(On the twelfth day, blood was drawn directly from the heart, then autopsy, and the lung was taken completely.
5. Fourth Transaction Group (T4 :(On the sixteenth day, blood was drawn directly from the heart, it was autopsy, and the lung was taken completely.
6. Fifth Transaction Group (T5 :(Also on the twentieth day, blood was taken directly from the heart and dissected, and the lung was taken completely.

Collection of blood samples

The animals were anesthetized after the end of each trial, with a mixture of 0.3 ml ketamine and 0.1 ml xylazine per kg of body weight injected into the peritoneum (IP ,(And blood was drawn from the heart of each animal directly by heart prick Cardiac PuncturePaste with sterile 5 ml medical syringes Keep 2 ml of blood in tubes containing an anticoagulant (EDTA)For the purpose of conducting blood tests, and placing the remaining part of the blood in special tubes free of anti-coagulation and after the coagulation process took place, it was circulated in a

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centrifuge at a speed of 3000 rpm / minute for 15 minutes in order to obtain blood serum, and it was placed in 1 ml plastic tubes and kept at a temperature -20 ° C until the tests are carried out. The whole lung was taken and preserved in 10% formalin.

Hematological parameters

Hematological parameters were measured using a blood analyzer Blood analyzer Factory by a company HorribaFrench, included the total number of white blood cells) WBCs **10 x ^{3}** / L (As well as the differential count of leukocytes.

Measurement of serum IL-17

Basic principle

Been investigatedIL-17 And measuring its levels in blood serum by the method of thELISA According to the kit supplied by a company ABO Swiss .

RESULTS

Differential count of leukocytes

The study showed significant significant changes P <0.05) (Between the control group and the study groups for a period of four days, as shown in Table (4-3). Where the results of the statistical analysis showed a significant decrease in the number of white blood cells in the group treated with cyclosporine with mushrooms.*A . fumigatus* Compared to a control group P <0.05)There was also a significant decrease among the group treated with the fungus *A.fumigatus*Without cyclosporine, compared to the control group. The results of the statistical analysis showed a significant increase in the lymphocytes of the group treated with cyclosporine with the fungus.*A.fumigatus* Compared to a control group (P <0.05As well as a significant increase among the group treated with mushrooms*A.fumigatus* Without cyclosporine, compared to the control group. The statistical analysis also showed a significant decrease in the neutrophil cells of the group treated with cyclosporine and mushrooms*A.fumigatus*Compared to a control group (P <0.05Also, there was a significant decrease among the treated group With mushrooms*A.fumigatus*Without cyclosporine, compared to the control group. The results of the statistical analysis showed a significant increase in monocytes of the group treated with cyclosporine and mushrooms*A.fumigatus* Compared to a control group (P <0.05As well as a significant increase among the group treated with mushrooms*A.fumigatus*Without cyclosporine, compared to a control group. Also, the results of the statistical analysis showed a significant increase in the acid cells of the group treated with cyclosporine with the fungus.*A.fumigatus*) Comparison to control group)P <0.05Also, there was a significant increase in the group treated with the fungus*A.fumigatus* Without cyclosporine, compared to the control group, and the following table shows the significant differences.

Table (1) shows the significant changes in hematological parameters between the control groups and the study groups

Groups	Mean ± SEM (4 DAYS)				
	WBCs (10 x ^{3})	Lymphocytes%	Neutrophils%	Monocytes%	Eosinophils%
Control	8.79 ± 0.074 A	67.7 ± 0.957 C	21.24 ± 0.449 A	5.58 ± 0.299 C	3.46 ± 0.185 C
Cyclo + AF	5.374 ± 0.073	90.81 ± 0.478 A	13.192 ± 0.0386	8.24 ± 0.101 A	6.52 ± 0.132 A

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	C		**C**		
AF	**6.79 ± 0.074 B**	**87.7 ± 0.95 B**	**15.84 ± 0.595 B**	**7.38 ± 0.285 B**	**5.56 ± 0.149 B**
LSD	**0.0021**	**2.514**	**1.023**	**0.756**	**0.421**

- Different letters indicate significant significant differences P <0.05).(
- Similar letters indicate no significant differences (P <0.05)

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Also, the results of the study showed significant significant changes (P <0.05)Between the control group and the study groups for an eight-day period as shown in Table 4-)4 .(Where the results of the statistical analysis showed a significant decrease in the number of white blood cells for the group treated with cyclosporine and mushrooms.*A.fumigatus* Compared to a control group (P <0.05) As well as a significant decrease among the group treated with the fungus*A.fumigatus*Without cyclosporine, compared to the control group. The statistical results showed a significant increase in the lymphocytes of the group treated with mushrooms and cyclosporine compared to the control group.(P <0.05)(With a significant increase among the group treated with mushrooms without cyclosporine compared to the control group, and the results showed a significant decrease of neutrophilic cells in the group treated with mushrooms and cyclosporine compared to the control group (P <0.05)With a significant decrease among the group treated with mushrooms without ciclosporin compared to the control group, and the results of the study showed a significant increase in monocytes in the group treated with mushrooms and cyclosporine compared to the control group)P <0.05 (And a significant increase among the group treated with mushrooms without cyclosporine compared to the control group, and the results of the statistical analysis showed a significant increase of acid cells in the group treated with mushrooms and cyclosporine compared to the control group P <0.05) (And a significant increase among the group treated with the fungus without cyclosporine compared to the control group.

Table (2) shows the significant changes in hematological parameters between control groups and study groups (8 days)

Groups	**Mean ± SEM (8 days)**				
	WBCs (10×3)	**Lymphocytes%**	**Neutrophils%**	**Monocytes%**	**Eosinophils%**
Control	**8.79 ± 0.074 A**	**67.7 ± 0.957 C**	**21.24 ± 0.449 A**	**5.58 ± 0.299 C**	**3.46 ± 0.185 C**
Cyclo + AF	**5.392 ± 0.096 C**	**90.792 ± 0.408 A**	**13.224 ± 0.098 C**	**8.38 ± 0.132 A**	**6.52 ± 0.203 A**
AF	**6.768 ± 0.152 B**	**84.99 ± 1.57 B**	**15.84 ± 0.578 B**	**7.54 ± 0.12 B**	**5.42 ± 0.172 B**
LSD	**0.125**	**4.521**	**1.321**	**0.541**	**0.412**

The results showed significant significant changes (P <0.05) Between the control group and the study groups for a period of twelve days, as shown in Table (4-5). Where the results of the statistical analysis showed a significant decrease in the number of white blood cells for the group

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treated with cyclosporine and mushrooms.*A.fumigatus* Compared to a control group (P <0.05As well as a significant decrease among the group treated with the fungus*A.fumigatus* Without cyclosporine compared to the control group, the statistical results showed a significant increase in the lymphocytes of the group treated with cyclosporine and mushrooms compared to the control group P <0.05) (With a significant increasein the group treated with mushrooms without cyclosporine compared to the control group, and there was a significant decrease in neutrophilic cells in the group treated with mushrooms and cyclosporine compared to the control group (P <0.05)With a significant decrease among the group treated with mushrooms without cyclosporine compared to the control group, and there was a significant increase in monocytes in the group treated with mushrooms and cyclosporine compared to the control groupP <0.05And a significant increase in the group treated with mushrooms without cyclosporine compared to the control group, and also the results of the statistical analysis showed a significant increase in the acid cells in the group treated with mushrooms and cyclosporine compared to the control groupP <0.05And a significant increase among the group treated with the fungus without cyclosporine compared to the control group.

Table (3) shows the significant changes in hematological parameters between control groups and study groups

Groups	**Mean ± SEM (12 days)**				
	WBCs (10×3)	**Lymphocytes%**	**Neutrophils%**	**Monocytes%**	**Eosinophils%**
Control	**8.79 ± 0.074 A**	**67.7 ± 0.957 C**	**21.24 ± 0.449 A**	**5.58 ± 0.299 C**	**3.46 ± 0.185 B**
Cyclo + AF	**6.692 ± 0.108 C**	**74.856 ± 0.470 A**	**17.342 ± 0.243 C**	**6.1 ± 0.014 A**	**4.226 ± 0.070 A**
AF	**7.136 ± 0.040 B**	**70.726 ± 0.280 B**	**18.31 ± 0.072 B**	**5.992 ± 0.053 B**	**4.024 ± 0.014 A**
LSD	**0.0321**	**2.014**	**0.854**	**0.455**	**0.321**

The results showed significant significant changes (P <0.05 (Between the control group and the study groups for a period of sixteen days, as in Table (4-6), where the results of the statistical analysis showed a significant decrease in the number of white blood cells for the group treated with cyclosporine and mushrooms *A.fumigatus* Compared to a control group (P <0.05As well as a significant decrease among the group treated with the fungus*A.fumigatus* Without cyclosporine compared to the control group, the statistical results showed a significant increase in the lymphocytes of the group treated with cyclosporine and mushrooms compared to the control group P <0.05) (With a significant increase in the group treated with mushrooms without cyclosporine compared to the control group, and there was a significant decrease in neutrophilic cells in the group treated with mushrooms and cyclosporine compared to the control group P <0.05))With a significant decrease among the group treated with mushrooms without cyclosporine compared to the control group, and the results showed a significant increase in monocytes in the group treated with mushrooms and cyclosporine compared to the control group)P <0.05)And a significant increase in the group treated with the fungus without

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cyclosporine compared to the control group, and also the results of the statistical analysis gave a significant increase for the acid cells in the group treated with mushrooms and cyclosporine compared to the control group)P <0.05 (And a significant increase among the group treated with the fungus without cyclosporine compared to the control group.

Table (4)Shows the significant changes in hematological parameters between control groups and study groups

Groups	Mean ± SEM (16 days)				
	WBCs (10×3)	Lymphocytes%	Neutrophils%	Monocytes%	Eosinophils%
Control	8.79 ± 0.074 A	67.7 ± 0.957 C	21.24 ± 0.449 A	5.58 ± 0.299 C	3.46 ± 0.185 B
Cyclo + AF	7.178 ± 0.033 C	70.766 ± 0.531 B	18.05 ± 0.035 C	5.94 ± 0.08 B	4.164 ± 0.043 A
AF	7.496 ± 0.09 B	72.57 ± 0.512 A	19.21 ± 0.187 B	6.174 ± 0.129 A	4.104 ± 0.072 A
LSD	0.041	1.520	0.856	0.321	0.124

Table (4-7) shows the results of the current study, which showed significant significant changes (P <0.05 (Between the control group and the study groups for a period of twenty days as in Table (4-7), where the results of the statistical analysis showed a significant decrease in the number of white blood cells for the group treated with cyclosporine and mushrooms *A.fumigatus* Compared to a control group (P <0.05As well as a significant decrease among the group treated with the fungus*A.fumigatus* Without cyclosporine compared to the control group, the statistical results showed a significant decrease in lymphocytes for the group treated with cyclosporine and mushrooms compared to the control group P <0.05) (With a significant decrease among the group treated with mushrooms without cyclosporine compared to the control group, and the results also showed a significant decrease of neutrophilic cells in the group treated with mushrooms and cyclosporine compared to the control group P <0.05))With a significant increase among the group treated with mushrooms without cyclosporine compared to the control group, and showed a significant decrease in monocytes in the group treated with mushrooms and cyclosporine compared to the control group)P <0.05)And a significant increase in the group treated with mushrooms without cyclosporine compared to the control group, and also the results of the statistical analysis showed a significant decrease of acid cells in the group treated with mushrooms and cyclosporine compared to the control group)P <0.05There was no significant difference between the group treated with mushrooms without cyclosporine compared to the control group.

Table (5) Demonstrates significant changes in hematological parameters between control groups and study groups

Groups	Mean ± SEM (20 days)				
	WBCs (10×3)	Lymphocytes%	Neutrophils%	Monocytes%	Eosinophils%
Control	8.79 ± 0.074	67.7 ± 0.957 A	21.24 ± 0.449 A	5.58 ± 0.299 A	3.46 ± 0.185 A

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	A				
Cyclo + AF	**8.15 ± 0.043 C**	**67.26 ± 0.807 A**	**20.24 ± 1.096 C**	**5.356 ± 0.370 B**	**3.166 ± 0.133 B**
AF	**8.49 ± 0.074 B**	**65.292 ± 0.969 B**	**21.154 ± 0.817 B**	**5.66 ± 0.308 A**	**3.466 ± 0.075 A**
LSD	**0.101**	**1.21**	**0.521**	**0.133**	**0.231**

Immunological parameters

Concentration of IL-17

The results of the current study showed significant significant changes (P <0.05)Between the control group and the study groups for a period of four days in concentrations)IL17)In rat serum as in Table (4-8), where the results of the statistical analysis showed a significant increase in the concentration of interleukin.)IL17For the group treated with cyclosporine and mushrooms *A.fumigatus* Compared to a control group (P <0.05It showed a significant increase among the group treated with the fungus *A.fumigatus* Without cyclosporine, compared to the control group

Table (6) shows the significant changes in the immunological parameters for (IL17 (Between the control groups and the study groups.

Groups	**Mean ± SEM (4 days)**
	IL- 17 pg / ml
Control	**103.2 ± 1.166 C**
Cyclo + AF	**4599 ± 14.75 A**
AF	**3978.2 ± 15.56 B**
LSD	**121.21**

- **Different letters indicate significant significant differences P <0.05).(**
- **Similar letters indicate no significant differences (P <0.05).**

The results of the current study showed significant significant changes (P <0.05)Between the control group and the eight-day study groups in concentrations)IL17)In rat serum as in Table (4-9), where the results of the statistical analysis showed a significant increase in the concentration of interleukin (IL17For the group treated with cyclosporine and mushrooms *A.fumigatus* Compared to a control group (P <0.05Also, it showed a significant increase among the group treated with the fungus *A . fumigatus* Without cyclosporine compared to the control group,

Table (7) shows the significant changes in the immunological parameters for (IL17 (Between the control groups and the study groups.

Groups	**Mean ± SEM (8 days)**
	IL- 17 pg / ml

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Control	**108.6 ± 1.019 C**
Cyclo + AF	**5534.6 ± 7.787 A**
AF	**4755.8 ± 7.082 B**
LSD	**110.21**

The results of the current study showed significant significant changes (P <0.05)Between the control group and the twelve-day study groups in concentrations)IL17)In rat serum as in Table (4-10), where the results of the statistical analysis showed a significant increase in the concentration of interleukin (IL17For the group treated with cyclosporine and mushrooms *A.fumigatus* Compared to a control group (P <0.05Also, it showed a significant increase among the group treated with the fungus *A.fumigatus* Without cyclosporine, compared to the control group.

Table (8) shows the significant changes in the immunological parameters for (IL17 (Between the control groups and the study groups.

Groups	**Mean ± SEM (12 days)**
	IL- 17 pg / ml
Control	**106.8 ± 3.487 C**
Cyclo + AF	**3584.4 ± 36.53 A**
AF	**3148.4 ± 13.36 B**
LSD	**114.21**

The results of the study showed significant significant changes (P <0.05)Between the control group and the sixteen-day study groups in concentrations)IL17)In rat serum as in Table (4-11), where the results of the statistical analysis showed a significant increase in the concentration of interleukin.)IL17For the group treated with cyclosporine and mushrooms *A.fumigatus* Compared to a control group (P <0.05Also, it showed a significant increase among the group treated with the fungus *A.fumigatus* Without cyclosporine, compared to the control group.

Table (9) shows the significant changes in the immunological parameters for (IL17 (Between the control groups and the study groups.

Groups	**Mean ± SEM (16 days)**
	IL- 17 pg / ml
Control	**107.2 ± 1.720 C**
Cyclo + AF	**2896.8 ± 32.43**

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	A
AF	**2612.8 ± 24.23 B**
LSD	**125.45**

The results of the study showed the presence of significant significant changes (P <0.05)Between the control group and the study groups for a period of twenty days in concentrations)IL17)In rat serum as in Table (4-12), where the results of the statistical analysis showed a significant increase in the concentration of interleukin (IL17For the group treated with cyclosporine and mushrooms *A.fumigatus* Compared to a control group (P <0.05Also, it showed a significant increase among the group treated with the fungus *A.fumigatus* Without cyclosporine, compared to the control group

Table (10) shows the significant changes in the immunological parameters for (IL17 (Between the control groups and the study groups.

Groups	**Mean ± SEM (20 days)**
	IL- 17 pg / ml
Control	**108.4 ± 1.35 C**
Cyclo + AF	**2111 ± 31.96 A**
AF	**1850.2 ± 4.66 B**
LSD	**144.21**

DISCUSSION

Hematological standards

Total and differential white blood cell count

White blood cells or white blood cells are cells of the immune system that participate in the defense of the body against both infectious diseases, foreign substances and infections, and the number of white blood cells is often indicative of diseases (Lafleur-brooks, 2008).Be exposed to spores *A. fumigatus* It leads to an inflammatory lung infection that depends on the white blood cells and their types, and dysfunction in immunocompetent rats, as well as more immunosuppressed, and white blood cells contribute to innate and acquired immunity. (Shamri *et al*, 2011; Hogan *et al* , 2008) The results of the present study showed that the pulmonary fungal infection led to a decrease in the total number of white blood cells for the groups treated with the fungus. *A.fumigatus* And cyclosporine, as well as groups that have been treated only with fungiAf With a significant difference, the highest percentage of decrease was in the two periods (4 days and 8 days) compared to the control group, after which the cells returned to their normal proportions. This study agreed with a number of studies, including one (Van Etten *et al* , 2000) Which indicated that the number of white cells returned to normal after the disappearance of the

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peak of the infection, as some types of infections cause a decrease in the white blood cells, Patients with aspergillosis tend to have a low white blood cell count (Woitas *et al* , 1998)It is recommended to regularly monitor the number of leukocytes to ensure the correct status of the immunodeficiency condition(Stephens-Romero *et al* , 2005)Nevertheless it is important to emphasize here that any experimental immunosuppression can influence the host's response to infection and enhance complexity of the experimental animal's understanding. (Balloy *et al* , 2005). The results of the study showed a significant increase in lymphocytes at the onset of infection, especially on the fourth and eighth day, and the increase was in a large percentage for the animal treated with cyclosporine and the fungus, then it began to decrease and return to its normal state consistent with what was found. (Malacco *et al* , 2019). Also, the results of the study did not coincide with the findings of the study(Rooney *et al* 1998)Which indicated a lack of lymphocytes and lymphocytes play a major role in the host's defense against Aspergillus (Grazziutti *et al* , 2001). The results showed a decrease in the neutrophil cells also at the onset of infection and then returned to normal, and also the results showed a greater decrease in the animal treated with cyclosporine and the fungus, after which the neutrophil cells returned to their normal state on the sixteenth and twentieth days corresponding to what was found (Gosset *et al* , 1997). This study did not coincide with his findings (Kallenbach *et al* , 1992)And that the rats deficient in these leukocyte groups contained conidial germination and did not develop an invasive disease, and previous studies showed that depletion and depletion of neutrophils leads to increased pulmonary recruitment to clear the infection (Park *et al* , 2010) in cases of fungal infection, there are differences resulting from the isolates of the strain and fungi species as a result of the virulence factors that they possess, the amount of suspension, the site of infection and the sensitivity are all major points related to the growth of fungi and its colonization of the organ, thus it will affect the outcome of the infection and lead to physiological and functional differences and cause varied immunity, inflammatory responses and results The disease is not clear due to the strength and virulence of the pathogen (Caffrey-Carr et al., 2017) Different genetic backgrounds of a pathogen, such as cell wall formation, may be able to generate varied outcomes.

Neutrophil cells have been recognized as an essential cell in defense against IA Consistently neutropenia is an important clinical risk factor (Segal, 2009)The results of the current study showed an increase on the fourth and eighth days of monocytes in rats treated with mushrooms and rats treated with cyclosporine and fungi with a higher percentage, then they returned to their normal rates, and no statistical differences appeared on the twentieth day, and this corresponds to what was foundEspinosa et al, 2017Which showed that the inflammatory monocytes have an immune role against fungi, either by direct fungal killing or by regulating the inflammatory environment in the lung. The role of inflammatory monocytes in rats and mice and in humans can play an important role in defense againstIA The anti-fungal ability of monocytes in humans has long been recognized against *A.fumigatus* Cytokines can inhibit conidial germination (Roilides *et al* , 1994)For aspergillosis, mononuclear cells may be more important in initial disease control. (Kullberg, 1997) The results of the study showed an increase in acid cells in the animal treated with the fungus and the animal treated with the fungus and cyclosporine at a greater rate, and then they returned to their normal proportions, and no statistical differences appeared on the sixteenth and twentieth days, and this is an example of what he reached (Malacco *et al* , 2019 (And the (Adam *et al* , 2006)Which said that the increase is the result of the release of large quantities of inflammatory cytokines that increase the flow of acid cells and the increase occurs in order to combat disease and infection. This study did not agree with its

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findings (Abbas *et al* , 2005) Acid cells form a small group of leukocytes in the bloodstream, consisting of 1 to 5% of circulating cells, and a sudden increase in the acid cell count in some disease cases indicates that eosinophils are associated with the initiation of inflammatory processes. (Hogan *et al* , 2008; Fulkerson and Rothenberg, 2013). Groups of rats that were treated with immunosuppressants, ciclosporin and fungi A.fumigatus) CsA)Had pulmonary lesions with an increased number of acid cells in the lung (Wang *et al* , 1993) It was similar to the results of our study. Acid cells may be a potential target for controlling worsening inflammation and preventing tissue damage during this fungal infection (Malacco *et al* , 2019)Also, eosinophils have been shown to be another factor contributing to the removal of Aspergillus fuming from the lung (Murdock *et al* , 2012) The scarcity of fungal infections in people with healthy immune function is strong evidence that normal immunity has effective resistance to this class of microorganisms and therefore the clinical disease caused by fungal pathogens is often the result of the immune deficiency present in the host and the defects that predispose People with fungal infections have different fungal pathogens, including complete breakdown, such as neutropenia and impaired cellular immunity. (Mencacci et al, 2000; Romani, 1997) .

Interleukin -17

The current study is designed to define a role IL-17 In the inflammatory response after a single pulmonary exposure to Aspergillus fumigatus conidia Generating a strong response accompanied by increased expression IL17 And plays IL-17 An early role in generating the immune response when exposed to Aspergillus smoke, we conclude that the immune response in rats with the affected immune competence was more efficient and faster in the process of eliminating fungal infection, unlike the inhibited rats, which were late in clearing the infection despite their high immune standards, and the fungi were eliminated in the lungs of rats. In an environment rich in inflammatory cytokine content.

The innate and adaptive immune responses generate the most effective form of immunity to protect against Aspergillus *A.fumigatus* One of the primary aspects of the immune response against Aspergillus is to recognize and kill conidia and to activate appropriate host defenses to counteract the fungi that survived and migrated into the filamentous form (Von Eiff *et al* , 1995). In this study we showed that exposure to.*fumigatus* A It results in pneumonia and dysfunction in rats, whether immunocompetent or immunosuppressed. The results of the current study showed a significant increase in the concentration of interleukin 17 in the groups treated with the fungus. *A.fumigatus* And the groups treated with mushrooms and cyclosporine in particular on the fourth, eighth and twelfth day, then began to gradually descend to normal levels, and this study was consistent with what was found (Mirkov *et al* , 2014)Who said that there was a significant and transient increase during injury and also agreed with other studies (Hogan et al., 2008;Shamri et al., 2011)Those who indicated pneumonia in immunocompetent rats as a result of exposure to the fungus, and found (Valeri and Raffatellu, 2016)That IL17Although it is protected from fungal pathogens, it can cause chronic diseases and injuries when it is not tightly regulated leading to immune disorders. Opportunistic fungal infections were evident in those receiving cyclosporine as a possible complication (McAtee ET AL, 2017).

The results of our study also explain the high levels of eosinophils that contribute to killing Aspergillus smokers *A.fumigatus* During lung infection, it also works to reduce inflammatory cytokines in the lung, especially interleukin 17, and this is similar to what was mentioned

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(Lilly *et al* , 2014)and surely Produce IL-17 In both humans and rats by innate immune cells in peripheral tissues such as lung, intestinal mucosa, and interleukin 17 it has multidirectional effects on multiple cell types as it plays a major role in host defense against infection also in the development and crisis of inflammatory disorders (Cua and Tato, 2010) And immunocompetent hosts respond to invasion by fungal pathogens through the escalation of a coordinated response, consisting of both innate and adaptive immunity to the immune system, and we demonstrate that repeated exposure to *A. fumigatus* conidia It does not result in invasive aspergillosis or a fatal disease, but rather leads to the development of pneumonia (Romani, 2004). Our study shows that the elevation of interleukin 17 is explained by the occurrence of pulmonary Aspergillus infection in the study conducted on rats, and this study is to assess the immunological differences in the time of infection with Aspergillus pneumoniae in two different groups of immunocompetent and immunosuppressed rats, and it revealed a difference in the production of IL-17 The highest levels were set IL-17 In the immunosuppressed group and the non-inhibitory group that showed faster results in the removal of aspergillus, we conclude that Interleukin 17 Response can work TH17 As a defense against extracellular pathogens as a protective mechanism or as a bridge between innate and adaptive immunity, they also concluded mechanism (Sivick et al, 2010; Stockinger et al, 2007).

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