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JOURNAL OF UNIVERSITY OF BABYLON
For Pure and Applied Sciences (JUBPAS)

Vol.30; No.2.| 2022

Measurement of (IL-11) Levels in Patients with Rheumatoid Arthritis

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قياس مستويات (الانترليوكين-11) في مرضى التهاب المفاصل الروماتويدي

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Received:	23 /4 /2022	Accepted:	30 /5 /2022	Published:	30 /6 /2022

ABSTRACT

Background:

Rheumatoid arthritis (RA) is a chronic inflammatory autoimmune disease that affects the joints principally. Synovitis , cartilage and bone erosion are the most prominent symptoms of (RA). Stages of development of this disease are very complex, Synovial cells that rupture and form inflammation in the synovium, followed by cartilage and bone deterioration. Cytokines are proteins that play a crucial role in the onset arise causing and progression of the disease. This research aims to learn more about interleukin-11, which is a protein produced by the immune system. A cytokine belongs to the interleukin-6 family. It has pro- and anti-inflammatory potentials and its relationship to the disease can be determined by measuring the level of (IL-11) concentration.

Materials and Methods:

The current study included 45 patients with (RA), in addition to 45 (apparently healthy) subjects as a control group of the study. These samples were collected from Marjan Hospital in Babylon Governorate (joints unit) during the period from 1/11/2021 to 3/15/2022. The sera of all patients and control group were examined for determination of IL-11 concentration level, using enzyme-linked immunosorbent assays, which are a type of immunoassay in which the enzyme is coupled to (ELISA).

Results:

At the likelihood level, the study's findings have revealed a considerable decrease in IL-11 level ($P \leq 0.05$) for patients with (RA), when comparing the rates of the same criteria for the control group.

Conclusion:

The concentration of interleukin 11 in the sera of rheumatoid arthritis patients was found to be less than in the control group in the current investigation.

Key words:

Autoimmune disease, Inflamed synovial, Interleukin-11.

ISSN: 2312-8135 | Print ISSN: 1992-0652

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For Pure and Applied Sciences (JUBPAS)
Vol.30; No.2.| 2022

الخلاصة

مقدمة:

التهاب المفاصل الروماتويدي (RA) هو مرض مناعي ذاتي التهابي مزمن يصيب المفاصل بشكل أساس ، ويعد التهاب الغشاء المفصلي والغضاريف وتآكل العظام من أبرز الأعراض للمرض . مراحل تطور هذا المرض معقدة للغاية ، يتم خلالها تكاثر الخلايا الزليليّة التي تتلف وتشكل التهاب الغشاء الزليلي ، يليه الغضاريف وتدهور العظام . السيتوكينات هي بروتينات تلعب دورًا حاسمًا في ظهور المرض وتطوره .كان الهدف من هذا البحث معرفة المزيد عن الإنترلوكين −11 ، وهو سايتوكين ينتجه الجهاز المناعي ، والانترليوكين −11 ينتمي إلى عائلة الإنترلوكين −6 ، والتي لها إمكانات مؤيدة ومضادة للالتهابات وعلاقتها بالمرض عن طريق القياس لمستوى تركيز (IL-11).

طرق العمل:

اشتملت الدراسة الحالية على 45 مريضًا مصابًا بـــ (RA) ، بالإضافة إلى 45 (يبدو أنهم أصحاء) كمجموعة ضابطة للدراسة .جمعت هذه العينات من مستشفى المرجان بمحافظة بابل (وحدة المفاصل) خلال الفترة من 2021/11/1 إلى 2022/3/15 .تم فحص امصال جميع المرضى والمجموعة الضابطة لتحديد مستوى تركيز IL-11 باستخدام مقياس الممتز المناعي المرتبط بالإنزيم (ELISA).

الاستنتاجات:

، كشفت نتائج الدراسة عن انخفاض كبير في مستوى IL-11 عند مستوى احتمالية ($P\leq0.05$) للمرضى الذين يعانون من (الروماتيزم الرثوي) عند مقارنة معدلات نفس المعايير لمجموعة السيطرة.

الكلمات المفتاحية:

أمراض المناعة الذاتية ، التهاب الزليلي الملتهب ، انترلوكين −11.

INTRODUCTION

One of the most frequent rheumatic disorders is rheumatoid arthritis (RA). This disease affects almost all countries of the world in varying degrees, affecting, in general، between %1 and %3 of the world's population [1].

Rheumatoid arthritis is caused by a defect in the immune system, causing the immune system to attack the synovium, the lining that protects our joints. Inflammation leads to a thickening of the synovium which leads to the breakdown of cartilage and bone within the joint [2]. The tendons and ligaments around the joint are also affected, and their weakness leads to instability of the joint [3].

Rheumatoid arthritis is characterized by an inflammatory injury to the synovium, most of which are concentrated at the level of the joints of the hand, foot and knee as well as many other joints. The immune system attacks the eroding cartilage and bone that occurs in the joints of the body, with many external manifestations of the joint. The cause of this process is not clear [4,5], but the likely cause appears to have a genetic component. Although genes may not only cause rheumatoid arthritis, they can also make it more susceptible to environmental conditions that can

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cause it such as infections with some viruses and some bacteria. The disease and its evolution and the different stages during which the disease developed? It is achieved by the intervention of several media such as cytokines, prostaglandins and lytic enzymes. Cytokines are important mediators of the immune and inflammatory response to disease [6,7], and this has led to the suggestion of their role in autoimmune diseases, especially since the early 1980s when a relationship was discovered between cytokines and increased antigen presentation that leads to the development of autoimmunity [8] .

Cytokines have been studied in people with rheumatoid arthritis. It was found that some cytokines associated with rheumatoid arthritis (TNF, IL-1, IL-6). They play an important role in the onset and progression of RA, and it has been observed that the expression of these cytokines is increased in the disease [9] , and this increase in the expression of inflammatory mediators is reduced by the production of anti-inflammatory cytokines. For example, Interleukine-11 and TGF-beta and inhibitory cytokines are competitors of Interleukine-1 (IL-1) receptors and soluble TNF-alpha receptors, which have a significant effect in reducing disease severity and exacerbation [10] , and in the case of rheumatoid arthritis , the immune system secretes anti-inflammatory cytokines to suppress the inflammatory response, and it was observed that in disease the pro-inflammatory and anti-inflammatory cytokines are in an unbalanced state [11], Insufficient localization of anti-inflammatory cytokines.

This is almost valid for T-cell-derived cytokines, namely Interleukine-2 and Interleukine-4. They are also absent, which may impair T-regular cell generation and favor Th1 or Th17 immune response, and inflammation-inducing cytokines help attract too many inflammatory cells to the synovium that drive bone and joint destruction [12]. Interleukin-11 is produced largely by bone marrow cells and fibroblasts and acts as a growth factor for blood cells, as it stimulates platelet production and the growth and differentiation of bone marrow cells into macrophages [13], (LIF), IL-11 plays an important role in aspect of physiological works on its own or in conjunction with others IL-3 and stem cell factor that contributes to red blood cell production, recent data confirms that IL-11 can play an important role in the immune response, inflammation [14], and bone infiltration, all of which are important aspects in the pathogenesis of rheumatoid arthritis. It stimulates B cells to produce immunoglobulins.

IL-11 has effects on connective tissue cells and includes inflammatory and anti-inflammatory effects. IL-11, which is co-localized with IL-6 and TGFQ, can cause inflammation by stimulating tissue inhibitors of proteinase 1 (TIMP-1) in cells. synovial and chondrocytes, and several studies have shown that this cytokine has an effect on existing inflammation and inflammatory amplification processes in this disease [15,16,17].

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Materials and Methods

The samples were collected from the Arthritis Unit at Marjan Medical Hospital in Babil Governorate during the period from 11/1/2021 to 15/3/2022.The sample includes (45) patients in addition to the apparently healthy control group , noting that they were free of any symptoms, according to clinical diagnosis by the specialist physician (5 ml) of venous blood drawn from the subjects. The blood was placed in a Jel tube and kept until coagulation at room temperature (25-20) °C, then centrifuged at 3000 rpm for 10 minutes. The serum of the patients sample and the control group was examined for IL-11 concentration level using enzyme-linked immunosorbent assays (ELISA). According to the manual procedures of Abcam (UK) [18] ، and the statistical analysis (using the statistical system SAS version 9.4) was used to examine all data result (SAS institute inc, Cary,NC,USA). A t-test was used to compare the levels of IL-11 in the serum of the two groups The patients and controls.

Results and Discussion

The study's findings revealed that a significant decrease ($P<0.05$) in the level of IL-11 in patients compared with control group (6.56 ± 5.33), (41.76 ± 20.28) (pg/ml) respectively as illustrated in Fig. 1.

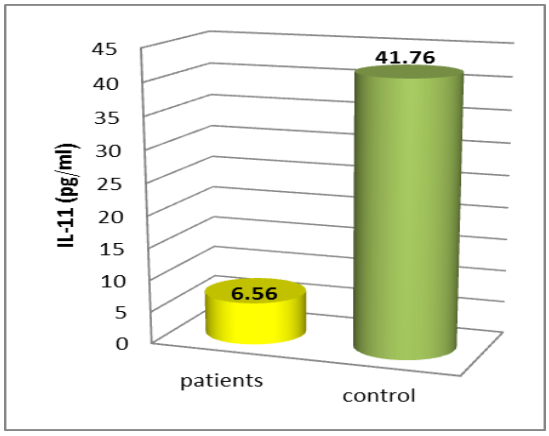

Fig. 1 : The level of IL-11 for (RA) patients and control group.

The physiological study of rheumatoid arthritis indicates the interference of many molecules and cells Natural and acquired immunity in the emergence and progression of the disease and the immunopathological mechanisms of rheumatoid arthritis are not clear [19].

In the presence of unknown pathogens, a non-specific immune response occurs. The joint lesions in rheumatoid disease begin with an inflammatory lesion within the synovial membrane called pannus ،, which is a proliferation of synovial tissue with infiltration of mononuclear cells, especially T lymphocytes [20,21]. This tissue invades the cartilage and bone surface of the joint, leading to the formation of erosions. Metalloproteases that degrade cartilage, humoral-mediated immune mechanisms with rheumatoid factors production of anti-IgG immunoglobulins autoantibodies to a number of anti-nuclear, anti-cytoplasm, anti-collagen, antibodies, cellular-mediated with overactivity of helper lymphocytes in the synovial tissue membrane [21], in addition to the mechanisms by which various cytokines, in particular TNFα-1, IL-6, and IL-6, are exerted by their specific effect.

Inflammatory IL-8 and its effect on multinucleated immune cells as neutrophils . Inflammatory cytokines play a key pathogenic role in inflammatory processes, synovial tissue proliferation and cartilage degeneration. Within inflamed joints, an imbalance occurs between stimulating cytokines such as IL-6, IL-1, TNFα and anti-inflammatory cytokines represented by IL-11. This study supports what was indicated [22,23], ،that the decrease in the level of interleukin 11 concentration in the serum of patients is reflected in its effect on increased inflammation and deterioration of cartilage due to increased pro-inflammatory and anti-inflammatory cytokines are in an unbalanced state. In the synovial tissue [24], other studies showed an increase in the level of interleukin 11 concentration as a result of increased secretion from fibroblasts, which is in the etiology of rheumatoid arthritis. IL-11 has a dual role as it enhances both synovial fibroblastic infiltration, and increases disease severity by increasing vascular invasion in the generalized RA [25,26].

Acknowledgments:

This research would not have been completed without the efforts of the health staff in Marjan Hospital, Rheumatology Unit in Babylon Governorate, who were credited with their contribution to collecting samples from patients, a special thanks to them. I would also like to thank the laboratories of the DNA Research center at the University of Babylon and its staff, who contributed in providing laboratory equipment to complete this research, Thanks are also extended to everyone who contributed to the evaluation and publication of this research.

ISSN: 2312-8135 | Print ISSN: 1992-0652
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Conflict of interests.

There are non-conflicts of interest.

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