

Research Article

Immune State Assessment in People with Diabetes Mellitus

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A B S T R A C T

Introduction: Diabetes is a metabolic condition characterised by high blood sugar levels, which can be caused by insulin resistance or insufficient insulin production by the body, which leaves cells unresponsive to the hormone. The goal of this study was to explore the immune status in Diabetes Mellitus (DM) patients by determining their IL-6 and IL-8 levels.

Method: Ninety diabetic patients, ranging in age from 30 to 65 years were selected for the study and 10 individuals were selected as control. All diabetic patients were admitted to the clinic in the province of Baghdad. 5 ml of blood sample was drawn from each subject for serum separation. The participant's information was written on the label of the tube, which was used for the IL-6 and IL-8 assays, which were purchased from the MyBioSource Company, USA. These tests were done according to the company's instructions.

Results: The current study showed an increase in the levels of IL-6 and IL-8 in patients with diabetes as compared to the control group.

Conclusion: The results of the study show that DM patients' blood levels of IL-6 and IL-8 have increased along with their general health. This indicates that immune response pathways may differ between individuals with and without diabetes.

Keywords: Diabetes, IL-6, IL-8, Immunity

Introduction

Diabetes, commonly known as Diabetes Mellitus (DM), is a collection of metabolic illnesses characterised by elevated blood sugar levels. These can be brought on by insulin resistance or insufficient insulin production by the body, which results in cells that do not respond to insulin. The characteristic symptoms of polyuria (continuous thirst), polydipsia (increased thirst), and polyphagia (increased appetite) are brought on by this hyperglycaemia.¹

There are three main types of diabetes: juvenile diabetes, which results from type 2 diabetes from the illness known as insulin resistance, in which cells occasionally fail to use insulin sufficiently, and diabetes type 1, which is caused by the body's inability to produce insulin and requires insulin injections (also known as IDDM), and gestational diabetes.^{2,3}

T cells, also known as T lymphocytes, are a subset of WBCs and are essential for cell-mediated immunity.⁴ T helper cells (TH cells) support other WBCs throughout immunological processes, such as B cells development into plasma cells as well as macrophage activation and cytotoxic T cell activation, among other tasks. These cells are also known as CD4+ T cells because they express the CD4 protein on their surface.

When peptide antigens are presented to helper T cells by Antigen-Presenting Cells (APCs) that express MHC class II molecules, the helper T cells become activated. After being triggered, they proliferate swiftly and emit microscopic proteins called cytokines, which regulate or enhance the active immune response.⁵ Apart from eliminating tumour cells and virus-infected cells, cytotoxic T lymphocytes, commonly known as CTLs, may potentially play a part in the rejection of organ transplants. These cells are also known as CD8+ T cells since they express the CD8 glycoprotein on their surface. The MHC class I antigen, which is present on nearly all of the body's cell surfaces, helps these cells recognise their targets.⁶

Diabetes mellitus patients are more likely to get bacterial, viral, and fungal infections.⁷ Immune dysfunctions are frequently cited as the cause of their greater susceptibility to infections and morbid consequences. Additionally, polymorph nuclear leukocytes have shown a variety of functional problems, particularly when the patients are in ketoacidosis.⁸

Patients with diabetes mellitus exhibit impaired cellular immunity, according to studies on CELL-MEDIATED IMMUNITY (CMI).^{9,10} Small proteins called cytokines were first believed to be immune system building blocks, but it has now been shown that they have a far larger function in physiology.¹¹

Acute phase proteins are stimulated to be generated by the cytokines that are released and take part in inflammatory

processes. These cytokines that are linked to inflammation include IL-1, IL-6, transforming growth factor, interferon, and IL-8. Although they are created by a wide range of cell types, macrophages as well as the monocytes in inflammatory parts are the main producers.¹² The goal of this study was to explore the immune status of diabetic patients by determining their levels of IL-6 and IL-8.

Materials and Methods

A prospective study was performed from October 2022 to February 2023. Ethical clearance was obtained from the Baghdad Province Health Coordinate, Ministry of Health, Iraq. Ninety diabetic patients, ranging in age from 30 to 65 years, were selected for the study and 10 individuals were selected as control. All diabetic patients were admitted to the clinic in the province of Baghdad. Blood samples (5 ml) were drawn from all patients for serum separation. The participant's information was written on the label of the tube, which was used for the IL-6 and IL-8 assays, which were purchased from the MyBioSource Company, USA. These tests were done according to the company's instructions. Statistical analysis was done using the SPSS software version.²³

Results and Discussion

The current study showed an increase in the levels of IL-6 and IL-8 in patients with diabetes as compared to the control group (Table 1).

Table 1. IL-6 and IL-8 Levels in Diabetic Patients and Control Group

| Test | Control | Diabetic Patients |
|--------------|-----------------|-------------------|
| IL-6 (pg/ml) | 702.1 ± 18.4 B | 913.8 ± 49.13 A |
| IL-8 (ng/ml) | 229.6 ± 13.51 B | 396.8 ± 5.2 A |

Diabetes mellitus is a metabolic disorder defined by aberrant glucose, protein, and lipid metabolism that is brought on by resistance to insulin. Inflammatory cytokines have a role in the pathophysiology of type 2 DM, which is an inflammatory illness.¹³ Inflammatory processes are linked to vascular alterations in people with metabolic disorders, reduced insulin release by pancreatic beta cells, as well as an increase in insulin resistance, mostly in the skeletal muscle. In-depth research has been done on the relationship between cytokines, insulin resistance, and type 2 DM. It appears that several mechanisms, including altered adipose tissue glucose uptake, lipolysis modulation, as well as an indirect increase in the levels of FFA that block the signalling pathway of insulin, all play a role in changing the immunity of diabetic patients.¹⁴ This study's major goal was to learn more about how inflammatory indicators contribute to the pathogenesis of type 2 DM. Since they facilitate the migration of inflammatory cells to the site of both acute and chronic inflammation, pro-inflammatory

cytokines like IL-6 and chemokines like IL-8 play a crucial role in causing an inflammatory situation.¹⁵ In the present study, we demonstrated that the levels of IL-6 and IL-8 were higher in DM subjects as compared to controls. This finding is consistent with earlier research that analysed the levels of IL-6 and IL-8 in DM subjects and demonstrated that cases had higher levels of IL-6 than controls.¹⁶ This work supported earlier research on retinopathy of prematurity¹⁷ by demonstrating elevated blood levels of IL-6 and IL-8 as well as a favourable connection between the two.

Conclusion

The results of the study showed that the blood levels of IL-6 and IL-8 in DM patients had increased along with their general health. This indicates that immune response pathways may differ between individuals with and without diabetes.

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