The relationship of Chemerin with type I and II diabetes patients in Kirkuk city

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Abstract

Background: Hyperglycemia, which can be caused by problems with insulin action, insulin secretion, or both, is one of the most prevalent symptoms of diabetes, which is one of the most common endocrine illnesses. Diabetes is the root cause of hyperglycemia, which in turn causes the body's metabolism to become dysfunctional. **Aims:** The study aimed at determining the levels of Chemerin in the serum of patients with type 1 and type 2 diabetes. **Materials and methods:** The study was conducted in Kirkuk City from the period between December 1st 2021 until the end of April 2022 and involved 100 diabetic patients (50 of the first type and 50 of the second type). The first group were children under 15 years while the second group aged between 45-64 years, blood was extracted from those patients who attended Kirkuk General Hospital. The control group involved 50 healthy individuals of matched age for type one and type 2 diabetes and apparently were healthy without history of diabetes or any chronic diseases. (25 children under the age of 15 as a control group (1) for patients with type 1 diabetes and 25 adults for type 2 diabetes). Five ml of venous blood was collected to assess blood sugar and chemerin levels. **Results:** The results showed that the elevated level of chemerin (13.66±1.73) ng/ml was in patients with type 2 diabetes, compared to control group 5.28±1.83 ng/ml. The study also revealed that chemerin level was higher (16.19±0.72) ng/ml in patients with type 2 diabetes compared to control group 5.99±1.66 ng/ml. In addition, it illustrated that the chemerin level (16.19±0.72) ng/ml was highest in patients with type 2 diabetes compared to type 1 diabetes 13.66±1.73 ng/ml. The difference between the two groups was statistically significant (P=0.001). Regarding blood sugar, high rate of blood sugar was recorded in people with type 1 diabetes 319.3±25.7 followed by type 2 diabetes 262.2±84.01.Normal blood sugar was recorded in the control group 88.16±10.52. **Conclusion:** Chemerin level was higher in diabetic patients especially in patients with retinopathy. We recommend that chemerin levels can be used to assess the condition of patients with diabetes mellitus.

Keywords: Chemerin, Diabetes, Retinopathy, Glucose, Kirkuk

1. Introduction

Hyperglycemia, which can be caused by problems with insulin action, insulin secretion, or both, is one of the most prevalent symptoms of diabetes, which is one of the most common endocrine illnesses. Diabetes can induce hyperglycemia, which can lead to malfunction in the general metabolism of the body, which can lead to abnormalities in the endocrine glands that are involved in the control of the body's metabolism. Diabetes mellitus is distinguished by persistent hyperglycemia as well as a dysfunctional metabolism of carbs, lipids, and proteins. An elevated blood glucose level, which is the primary cause of both short-term and long-term issues associated with diabetes, can create substantial deleterious consequences on a variety of metabolic pathways, including those associated with the endocrine system [(1)]. Diabetes has a role in the development of secondary metabolic diseases by causing the endocrine glands to alter their hormone production. Neuropathy, on the other hand, is the most prevalent neurological complication of diabetes, and it causes a worsening of the condition of the illness by impacting both the central nervous system and the peripheral nerve system. This is because neuropathy affects both of these systems. Patients who are currently residing in hospitals are the most likely to suffer from deficiency and hypersecretion of electrolyte disorders. Hypokalemia and hyperkalemia are conditions that manifest themselves when the content of potassium in the blood falls below 3.5 mmol/l or rises above 5.1 mmol/l, respectively. Hyponatremia is characterized by a blood sodium concentration of 135 mmol / l or less, and hypernatremia is characterized by a serum sodium concentration of 150 mmol / l or more. The primary mechanisms that contribute to an increase in serum electrolyte levels are an increase in the amount of electrolytes taken in, a reduction in the amount of electrolytes secreted by the kidneys, and a transformation of electrolytes from cells to extracellular fluid or from extracellular fluid to cells [(2)]. Diabetes is a chronic disorder that develops when the body is unable to generate any or enough of the hormone insulin or to utilise insulin efficiently. This causes blood glucose levels to increase, which leads to the development of diabetes. It is possible for diabetics to experience electrolyte abnormalities

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at varying stages of hyperglycemia as a result of insufficient fluid intake, a total absence of insulin, hyperintoxication, and/or dehydration [3].

It has been demonstrated that activation of protein kinase B in human adipocytes plays an essential part in the insulin-induced glucose absorption process (PKB)[4,5]. It accomplishes this mostly by inhibiting the ERK/NF-KB pathway or the p38/JNK pathway, both of which are involved in the inflammatory process. It was shown that the concentration of chemrin-1 diffusion in the blood was lower in individuals who had obesity, insulin resistance, and diabetes mellitus, all of which are strongly associated to one another. Chemrin-1 is interesting to investigate since it is a protective molecule against insulin resistance and inflammation; therefore, it is useful to study its function in the development of diabetic retinopathy. [6].

2. Materials and Methods

This research was carried out in the city of Kirkuk from the first of December 2021 all the way through the month of April 2022. Patients with type I diabetes ranged in age from less than 15 to more than 64 years old, while patients with type II diabetes were in the age range of 45 to 64 years old. Patients with diabetes who attended Kirkuk General Hospital were recruited for this study after receiving written consent from each participant. In addition, the research involved 50 healthy people who did not appear to have diabetes or any other chronic diseases. There were 25 children under the age of 15 who served as a control group for patients with type I diabetes, and there were 25 adults who served as a control group for patients with type II diabetes. After collecting five milliliters of venous blood from each participant and transferring it to two tubes, one milliliter was added to EDTA tubes in order to determine the level of HbA1c using immunofluorescence technology (i-chroma II). The other part of the blood was transferred to sterile gel tubes, allowed to clot at room temperature for twenty minutes, and then spun at three thousand revolutions per minute for fifteen minutes.

Ethical approval: Approval permission was presented to the director of Kirkuk Health Directorate according to the document number 177 (including the number and the date in 27/11/2021). An interview was conducted with these patients using a questionnaire form created by the investigator, which included demographic information such as age, gender.. etc.

3. Results

The study showed that significant difference between patients and control was recorded in terms of age (Table 1).

Table 1: Comparison of study totals in relation to age

Study Totals	Number	Age (mean±standard deviation)	P. value
Type 1 diabetes mellitus	50	13.65 ± 3.66	>0.05
Control Group 1	25	13.77 ± 4.33	
Type 2 diabetes mellitus	50	45.33 + 9.34	>0.05
Control Group 2	24	45.33 + 8.13	

The result also revealed that there was no significant difference between type I and type II diabetes mellitus regarding patients and control groups, i.e. the distribution of males and females between the groups was parallel and there was no significant difference between them(Table 2).

Table 2: Gender distribution in patients and control groups.

Study Totals	Male		Female		Total	
	No.	%	No.	%	No.	%
Type 1 diabetes mellitus	24	48	26	52	50	100
Control Group 1	12	48	13	52	25	100
Type 2 diabetes mellitus	22	44	28	56	50	100
Control Group 2	13	52	12	48	25	100

Our data revealed that elevated rates of chemerin (13.66±1.73) ng/ml was noticed in patients with type 2 diabetes mellitus compared to control group 5.28±1.83 ng/ml. The difference between the two groups was statistically significant (P value: 0.001) as shown in Table 3.

Table 3: Comparison of Chemerin levels in Type 1 Diabetes and Control Group.

Variables (Mean±Standard Deviation)	Type 1 diabetes mellitus (n:50)	Control Group 1 (n:25)	P value
Chemerin ng/ml	13.66±1.73	5.28±1.83	0.001

The study illustrated that the increased levels of chemerin (16.19±0.72) ng/ml was in patients with type 2 diabetes compared to control group 5.99±1.66 ng/ml. The difference between the two groups was statistically significant (P value: 0.001) as shown in Table 4.

Table 4: Comparison of Chemerin levels in Type II Diabetes Group 2 and Control Group 2 in terms of Rate

Variables (Mean±Standard Deviation)	Type 2 diabetes mellitus (n:50)	Control Group 2 (n:25)	P value
Chemerin ng/ml	16.19±0.72	5.99±1.66	0.001

The data presented here displayed that the highest levels of chemerin (16.19±0.72) ng/ml was recorded

in patients with type 2 diabetes compared to the type 1 diabetes 13.66±1.73 ng/ml and difference between the them was statistically significant (P value: 0.009) as shown in Table 5.

Table 5: Comparison of chemerin levels in Type I and II diabetes groups

Variables (Mean±Standard Deviation)	Type 1 diabetes mellitus (n:50)	Type 2 diabetes mellitus (n:50)	P. value
Chemerin ng/ml	13.66±1.73	16.19±0.72	0.009

The results shown here indicated that chemerin levels was highest in patients with type II diabetes with retinopathy 9.34±0.91 ng/ml compared to type II diabetes patients without retinopathy 6.48±0.83 ng/ml with significant difference between them as shown in Table 6

Table 6: Comparison of Chemerin Level in Type II Diabetes Patients with and without Retinopathy

Chemerin (ng/ml)	Patients with type II diabetes mellitus		P. value
	Diabetic retinopathy (n:25)	Non retinopathy (n:25)	
Mean±SD	9.34±0.91	6.48±0.83	<0.001
Minimum	7.66	4.35	
Maximum	10.34	8.23	

4. Discussion

Diabetes mellitus (DM) is a metabolic illness that is defined by a chronic hyperglycemic state that is caused by deficiencies in either the production of insulin or the action of insulin, or both. Diabetes mellitus may also be abbreviated as diabetes. In infants, a lack of glucokinase, which is an intrinsic defect in the course of glucose and insulin communication, is the cause of diabetes mellitus, which is a kind of diabetes that is permanent [8]. The number of people who have diabetes is expected to more than double by the year 2030, according to a projection made by the World Health Organization (2003). In the year 2000, there were 177 million individuals who were diagnosed with diabetes. By 2030, that number is expected to rise to 370 million. The prevalence of diabetes is expected to increase by 64 percent by the year 2025, according to the projections of medical professionals, "which implies that an astounding 53.1 million residents would be affected by the condition." [9,10]. Visceral adipose tissue is the source of the key adipokine chemrin-1, which is secreted there [11]. It is well knowledge that the metabolism of glucose and the production of insulin are both profoundly influenced by a number of different processes, some of which are direct and others of which are indirect. In addition, these potential pathways imply that the release of the changed chemrin-1 may result in glucose homocystosis, which may then lead to the development of diabetes.[12]. Pan *et al* [13] revealed that the concentration of chemrin-1 in patients with type 1 diabetes and controls did not differ significantly from one another. In general, a significant number of research that have been conducted throughout the past few years on the connection between chemrin-1 and DM have revealed inconsistent results. For instance, chemrin-1 concentrations in patients diagnosed with diabetes have been shown to decrease in a number of clinical investigations [14]. It is not known whether a high level of chemerin is a cause or a consequence of type 2 diabetes; however, other studies have found that chemerin on C2CL2 muscle aropathomes in mice has been affected by insulin resistance through a nuclear reaction that is mediated by the f-B pathway of inflammation. This is despite the fact that it is unclear whether a high level of chemerin is a cause or a consequence of the disease [15]. In individuals with type 2 diabetes mellitus, elevated levels of chemerin have also been demonstrated in other investigations.[16]. The data of this study is differ from Takahashi *et al.* [17], the questions that have the opposite effect and may improve absorption of insulin stimulation in adipocytes by changing and increasing insulin sensitivity and then having a higher level of chemerin was a compensatory strategy for insulin resistance patients.

Yasir et al (18) observed that the amount of chemerin in serum is considerably greater in the retinopathy group compared to the non-retinopathy group and healthy persons. Our findings regarding the increase of chemerin in retinopathy patients are in agreement with Yasir et al's findings. Our findings were similarly in agreement with those of Du et al. (19), who found that the blood levels of chemerin were considerably higher in individuals diagnosed with retinopathy. In addition to this, the findings that were presented by the Nakamura et al (20) demonstrated that the serum chemerin level is noticeably higher in type II diabetes patients in comparison to the control group.

5. Conclusions

The study showed that chemerin levels were high in diabetic patients especially in in those with retinopathy.

6. References

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