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Studying The Effect Of Interleukin 30, 38 Levels And Some Parameters In Young Children Patients With Type 1 Diabetes In Iraq

Hiba Hamza Rasheed
University of Tikrit, College of Science, Department of Chemistry
Email: Hibarasheed@tu.edu.iq

Abstract :

Children with type 1 diabetes have physiological problems characteristic. The current study aims to estimate some biochemical parameters such as lipid profile, liver enzymes, and other influencing Factors like age, gender, and BMI in 80 blood samples taken from children with type 1 diabetes. The variants included interleukins 30 and 38, two new interleukins with pathophysiological importance in type 1 diabetes. Results showed an increase in the levels of Interleukin 30 and 38 levels were higher in the sick group than in the healthy group. While there was a decrease in the levels of good fats and albumin. With regard to classifying patients according to age, a significant increase in the levels of interleukin 38 and 30 appeared compared to the control in the age group (5-10) and (11-16), while there is no significant difference when comparing the two age groups (5-10)(11-16) between the same patients. As for the classification of patients according to gender, the results showed significant differences between males and females regarding interleukin 30, while no significant difference appeared for interleukin 38. As for the classification of patients according to body mass index, a significant increase in interleukin 30 and 38 was observed in patients who are obese and overweight compared to patients with normal bodies.

Keywords: young children, type 1 diabetes, interleukin-30, interleukin-38.

دراسة تأثير مستويات الانترلوكين 30 و 38 وبعض المتغيرات لدى الأطفال الصغار المصابين بداء السكري من النوع الأول في العراق

هبة حمزة رشيد
جامعة تكريت ,كلية العلوم ,قسم علوم الكيمياء
Hibarasheed@tu.edu.iq

مستخلص:

يعاني الأطفال المصابون بداء السكري من النوع الأول من مشاكل فسيولوجية مميزة. تهدف الدراسة الحالية إلى تقدير بعض المعايير البيوكيميائية مثل مستوى الدهون وأنزيمات الكبد والعوامل المؤثرة الأخرى مثل العمر والجنس ومؤشر كتلة الجسم في 80 عينة دم مأخوذة من أطفال مصابين بداء السكري من النوع الأول. وشملت المتغيرات إنترلوكين 30 و38، وهما إنترلوكينان جديدان لهما أهمية فيزيولوجية مرضية في مرض السكري من النوع الأول. أظهرت النتائج ارتفاعاً في مستويات الإنترلوكين 30 و38 في مجموعة المرضى مقارنة بمجموعة السيطرة، في حين حدث انخفاض في مستويات الدهون الجيدة والألبومين. وفيما يتعلق بتصنيف المرضى حسب العمر، فقد ظهر ارتفاع معنوي في مستويات الإنترلوكين 38 و30 مقارنة بالسيطرة في الفئة العمرية (10–5) و(16–11)، في حين لا يوجد فرق كبير عند المقارنة بين المجموعتين. فئتين عمريتين (10–5)(16–11) بين نفس المرضى. أما بالنسبة لتصنيف المرضى حسب الجنس فقد أظهرت النتائج فروق ذات دلالة إحصائية بين الذكور والإناث فيما يتعلق بالإنترلوكين 30، بينما لم تظهر فروق معنوية بالنسبة للإنترلوكين 38. أما بالنسبة لتصنيف المرضى حسب مؤشر كتلة الجسم فقد لوحظ ارتفاع معنوي في الإنترلوكين 30. ولوحظ 38 في المرضى الذين يعانون من السمنة المفرطة وزيادة الوزن مقارنة بالمرضى ذوي الأجسام الطبيعية.

الكلمات المفتاحية: الأطفال الصغار، مرض السكري من النوع الأول، إنترلوكين-30، إنترلوكين-38 .

Introduction:

Type 1 diabetes is a medical condition where T-cells destroy diabetic β cells, leading to high sugar intake and insulin dependency [1]. The pancreas generates extremely little insulin on its own. It typically affects children and adolescents, although adult cases are not uncommon, and is known as latent auto-immune diabetes (LAD) [2]. The onset of type 1 diabetes is the result of a complex interaction between various environmental and genetic variables These are not entirely understood; nonetheless, research reveals that the environment influences the development of type 1 diabetes, as indicated by various symptoms in genetically similar people. It is suspected of being participated in the growth of a variety of illnesses, especially type 1 diabetes [3]. External variables are those that exist Viruses, bacteria, and chemicals are all found beyond our bodies. They can also encompass things like diet, exercise, and stress. People with Type 1 diabetes had larger quantities of damaging cytokines, however it is uncertain how persistent low-grade inflammation and environmental variables lead to the appearance of Type 1 diabetes. Both procedures are thought to have the potential to destroy pancreatic insulin-releasing neurons. [4].

IL-30 is a pleiotropic inflammatory cytokine that regulates disease and immunity [5]. It has been found that higher levels of IL-38 are related to diabetes [6, 7]. The predominant idea was that patients with T1DM have significantly greater IL-30 levels than those without T1DM [8], [9], [10], [11]. Yet, several inquiries found IL-6 levels in patients with T1DM were not substantially different. from controls, as evidenced by reduced abundance [12], [13], [14], and The study [15] is based on the divergence of study outcomes, we conducted an extensive meta-analysis to analyze the variation in serum IL-30,38 levels in Type 1 diabetes individuals. Although lipid levels in individuals with type 1 diabetes have been observed to be similar to those in nondiabetics [16], males with type 1 insulin are more likely to develop plaque accumulation than the general population. Several impediments to insulin therapy for preschoolers, as mentioned The issues raised in the 2014 article persist. Families continue to bear a significant share of the responsibility for treatment of diabetes in preschoolers. Diabetes management is hampered by

typical phases in children [17]. The current study aimed to determine the effect of interleukin 30,38 concentration and some variables such as lipid profile, liver enzymes, and other influencing When comparing youngsters who have type 1 diabetes to normal kids, characteristics include age, gender, and body mass index.

Materials and Methods

Serum samples were taken from 80 children and patients and 60 control between February 2023 and March 2024 in Salahuddin Hospital . The patients' ages varied from 5 to 16 years, with an average age. It was then placed in a freezer to investigate the impact of the parameters on the samples.

serum IL-30 (Cat. No. ELK9351) This assay has high sensitivity and excellent specificity for detection of Human sIL30 concentrations were measured according to manufacturer instructions using a kit provided by Bioassay Technology Laboratory(China) [18].

The test technique :-used in this kit is sandwich enzyme assay. The microtiter plate included in this kit has been pre-coated with an antibody specific to Soluble Interleukin 30 (sIL30). Standards or samples are added to the appropriate microtiter plate wells, followed by a biotin-conjugated antibodies that targets dissolve interleukin 30 (sIL30). Then, Avidin conjugated to Horseradish Peroxidase (HRP) is applied to each plate well and refrigerated. Upon adding the substrate from the TMB solution, only the holes containing Soluble Interleukin 30 (sIL30), biotin-conjugated antibody, and enzyme-conjugated The avidin will change color. The enzyme-substrate reaction is stopped by adding a sulphuric acid the solution, and the color change is detected spectrophotometrically at 450nm ± 10nm. The quantity of soluble interleukin 30 (sIL30) in the specimens is then calculated by contrasting the OD of the specimens to the norm line.

Serum IL-38 (Cat. No . MBS269990) Serum IL-38 concentrations were tested using commercially available ELISA kits supplied by My BioSource (USA), and the manufacturer's procedure was followed. This kit uses the "multiple Antibodies Sandwich" approach. The Double Antibody Sandwich concept relies on the properties of a target analyte with more than two potential epitopes, which may be detected concurrently by both the pre-coated capture

antibody and the detection antibody. [19].

Test the principle:- The already coated antibodies is anti-Human IL-38 monoclonal, while the detection antibody is a biotinylated polyclonal. Samples and biotinylated antibodies are added to ELISA plate holes and then rinsed using PBS or TBS. The holes are then treated with Avidin-peroxidase combines. The substrate of TMB is employed for coloring after the enzyme conjugate has been properly cleaned out of the holes with PBS or TBS. TMB combines with the activity of peroxidase to generate a blue product, which then becomes yellow upon adding a stop solution (Color Reagent C). The color intensity and quantity of the target analyte in the specimen have a positive correlation.

Determination of Lipid: The procedure that follows serves to determine the total amount of cholesterol colorimetrically. [20] .

(mg/ dL) = (A test / A standard) x Standard concentration. Concentration of standard = 200 mg/dL

A: Absorbance.

Determination of Serum Triglyceride Level (TG):-Serum triglyceride are measured using an enzymatic approach with a Biolabo (France) kit[21].

HDL-C levels can be determined as follows:-Serum HDL-C is measured using a kit made by Bio Labo (France) [22].

(LDL-C) and serum VLDL-C levels. Low density lipoprotein has been estimated using Fried ewald's [23]

LDL-C (mg/dL) =Total cholesterol-[HDL-C + TG/5]

Alanine Aminotransferase (ALT) levels were determined. The basic idea the method that follows is used to determine the rates of Alanine Aminotransferase (ALT), also known as Glutamic pyruvate transaminase (GPT).[24]

Aspartate aminotransferase, or AST drive:- Aspartate Aminotransferase (AST), additionally referred to as Glutamic Oxaloacetic Transaminase (GOT). [25]

The body mass index, or BMI, is computed by multiplying a body weight in kilograms by an elevation in meter squared (kg/m2), as illustrated as follows:

BMI = weight (kg)/height (m^2)[26]

Statistical method: The biochemical data were statistically evaluated using the statistical software tool SPSS 17.0. The mean standard deviation (SD) was estimated using ANOVA,

The level of statistical significance was established when the *P value* was equal to or less than 0.05.

Results:

Table 1 shows the results. showed increased concentration of interleukin 30 a significant P-value <0.01 in patients 25.51 ± 65.32 ()compared to controls7.29 ± 24.44)).This study revealed a considerable serum IL-30 level demographic characteristics table 1 shows the concentrations of interleukin 30 at different ages 5–10 and 11–16 increased significantly (63.19± 12.1) , (65.2±13.71) compered with control (24.0±7.56) , (22.81±5.91). In normal body patient the body mass affects of interleukin 30 is no significant (21.42±3.87) compered control (21.22±3.12),but in obese patient interleukin 30 increased significantly (48.2 ± 7.632) compered control (20±3.35) and in over wait patient interleukin 30 increased significantly (60.3±10.721) compered control (21.43±3.41). Male children had significantly greater concentrations of interleukin (55.31±6.83) than females (54.61±5.21), compared to control children in male (20.91±4.66) and female (26.22±3.101).

Table 1. Serum concentration of IL30 relative to their demographic parameters in patients compared to control groups.

Demographic Parameters		patient	control	P-Value
IL30 (ng/L)		65.26 ± 12.51	24.44 ± 7.29	0.009
Age (years)	(5-10)	63.19± 12.3	24.0 ± 7.56	0.008
	(11-16)	65.2±13.71	22.81±5.91	0.007
BMI kg/m2	Normal	21.42±3.87	21.22±3.12	0.287
	obese	48.2 ± 7.632	20±3.35	0.005
	Over wait	60.3±10.721	21.43±3.41	0.006
Sex	**Male**	55.31±6.83	20.91±4.66	0.003
	Female	54.61±5.21	26.22±3.101	0.0041

Table 2 showing the concentration of interleukin38 increased a significant (P<0.05) in patients(230 ± 20.461) compared to controls (146 ± 12.056). This study revealed a considerable serum IL-38level demographic charac-

teristics. at different ages a significant increase at ages 5–10(228.7 ± 19.3) compered with control(148 ± 12.87) and in patient increase at ages 11–16 (221.5 ± 20.12)compered the control (161.3 ± 15.65). The result shown interleukin-38 concentration of body mass index in normal patient increased significant (203±14.76), compared to the control group (183±12.34) and in obese increased (223.1 ± 19.5) compared to the control group(188.2 ± 13.65).In over wait patient increased significant (227.5±20.41), compared to the control (187 ±13.21). The concentrations of interleukin in male children patient is increased a significantly (217.3 ± 22.81) compered control (201.2 ± 29.6), and in female increased a significant (228.6 ± 26.4) compered control (198.1 ± 28.2) ,But That isn't any significant distinction amongst men and women.

(Table 2): Serum concentration of IL-38 relative to their demographic parameters in patients compared to control groups.

Demographic Parameters		**patient**	**contr**ol	P-Value
IL38 (ng/L)		230 ± 20.461	146 ± 12.056	0.007
Age (years)	(5-10)	228.7 ± 19.3	148 ± 12.87	0.004
	(11-16)	221.5 ± 20.12	161.3 ± 15.65	0.005
BMI kg/m2	Normal	203±14.76	183±12.34	0.002
	Obese	223.1 ± 19.5	188.2 ± 13.65	0.003
	Over wait	227.5±20.41	187 ±13.21	0.005
Sex	Male	227.3 ± 26.81	201.2 ± 29.6	0.0061
	Female	228.6 ± 26.4	198.1 ± 28.2	0.005

Table 3 we found no discernible change in the lipid profile between the control group (184 ± 0.419) and the patients (183 ± 0.89). In terms of triglycerides, we observed that patient levels were higher (157±0.911) than control levels (133±0.631). We found that patients' levels of healthy fats significantly decreased (36 ± 0.232) compared to the control group (40 ± 0.413). we found LDL that the patients (124±0.752) and the control group's

(118±0.695) differences are more notable. We observed that the alanine aminotransferase enzyme was more active in pediatric Patients having primary diabetes. (16±0.272) When contrasted with the unaltered group.(11±0.86) , regarding aspartate aminotransferase, we found that there was no statistically significant difference between the children with diabetes (25±0.557) and the control group (27±0.541). On the other hand, we observed that the albumin level or action in the patinate group (89±0.557) was lower than that of the control group (94±0.721).

Table 3: Serum concentrations of studied parameter groups

Parameters	patients	Control	P-Value
Cholesterol mg/d	183 ± 0.89	184 ± 0.419	0.501
HDL mg/d	36 ± 0.232	40 ± 0.413	0.235
Triglyceride mg/d	157 ± 0.911	133 ± 0.631	0.811
LDL mg/d	124 ± 0.752	118 ± 0.695	0.784
ALT U/L	16 ± 0.272	11 ± 0.86	0.287
AST U/L	25 ± 0.557	27 ± 0.541	0.612
ALP IU/L	89 ± 0.557	94 ± 0.721	0.90

Discussion

In this research, an evaluation of the level of interleukin 30 and 38 was studied in Iraq's youngsters with type 1 diabetes compared to the control. The results showed an increase in the level of interleukin 30 and 38 with an increase in the level of blood sugar. This is consistent with other studies where the duration of the disease may be a factor danger, especially when combined with uncontrolled high blood sugar , his agree with the study of Tangitibuken *et al*. (2021) that evaluate the levels of IL-30,38, a pro-inflammatory cytokine, in the blood of type 1 diabetics and healthy people. They discovered that IL-30 levels were significantly greater in people with T1DM than in normal people, suggesting that IL-30,38 may have a role in the development of T1DM[27]. The current research addressed demographic factors, and studied the effect of interleukin concentration on body mass in patients compared to healthy people with nor-

mal bodies. It did not show any clear difference in the body mass index .on the contrary, in those with obesity and overweight, the level of interleukin increased, This indicates that the concentration of interleukin in patients rises By increased weight, and this is consistent with other studies where obesity appears to be the main risk factor for diabetes and its associated complications, according to emerging evidence. [28]. A second study discovered that IL-30 is associated with obesity and type 1 diabetes, and might have an impact. in regulating adipose tissue hemostasis and chronic inflammation [29]. The results of our current study showed a higher concentration of interleukin 30 in males compared to females. As for interleukin 38, we did not notice any differences between females compared to males. study discovered that IL-30 is related with obesity and type 1 diabetes. It may also be involved in the regulation of adipose tissue hemostasis and chronic inflammation [30]. The study showed a relationship between the concentration of fats cholesterol, and triglycerides, which increase in patients with type 1 diabetes, as fats are linked to obesity. It is linked to fat and diabetes type 1, and it could influence adipose tissue hemostasis and chronic irritation[31]. This condition is characterized by elevated levels of triglycerides and low-density lipoprotein in plasma, as well as lower levels of high-density lipoprotein, which can be detected in individuals who have diabetes and a condition called.[32,33] .In the current study, the level of liver enzymes was associated with type 1 diabetes in children with type 1 diabetes, as the concentration of ALT decreased in the patients compared to the control, while the levels of AST and ALP increased in the patients IL-38 elevated in diabetes individuals and correlated positively with indicators of liver and kidney function, glucose metabolism, and serum lipids, indicating that IL-38 is a related component of inflammation and/or impaired metabolic. [34,35].

Conclusions: - The current study concluded that T1D patients have high levels of IL-30 and IL-38 in the bloodstream. These could be potential biochemical associated with a higher incidence of T1D in pediatric patients. High interleukin concentration and its effect have also been linked to age, gender, and body mass. In addition to studying the lipids profile and liver enzymes, a difference appeared in

the level of parameters increase and in some decrease in patients compared to the control group.

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