Study of Some Blood Indicators Associated with Infection with the Intestinal Parasite Giardia Lamblia in Diabetic Patients

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Abstract

This study was conducted on people attending hospitals in Babil Governorate and its environs from October 2022 to March 2023 to determine the relationship between the intestinal parasite Giardia lamblia and its relationship to diabetes by determining some blood indicators (Erythrocytes sedimentation, White Blood Cells, Hemoglobin, packed cell volume rate, and Hemoglobin). Blood Sugar High Density Lypoproteinuric acid serum.creatinin Blood .urea 'A1c Reactive protein cholesterol - (This study included the collection of (123) samples, of which (15) were stool samples from people who were confirmed to be infected with the Giardia lamblia parasite only to determine some epidemiological indicators of the parasite, including age, sex and (8) blood samples for people whose infection with the Giardia lamblia parasite and diabetes were associated with both, and (50) blood samples for people with diabetes only and comparing them with (50) blood samples from healthy people. There was a significant difference ($P < 0.05$) that reached (80) and (20), respectively.The results also showed that the highest percentage of infection with Giardia alamplia parasite was in the age group (1-10 years). The lowest infection rate was in the 40-year age group, with significant differences reaching 46.7% and (13.3%), respectively. The results showed that the infection rate in females infected with G. 37.5%. The results for people infected with the G.lamblia parasite and diabetes mellitus indicated an increase in the concentration of white blood cells, the volume of packed cells, and a decrease in the level of blood sedimentation and hemoglobin, which amounted to 9.2 cells / mm (40%), (12.3 g / dl, (28 mm / hr) on the Respectively, compared to the control group (7.5 cells / mm), (43), (20) 14.5 g / dl, respectively. As for people with diabetes only, the results showed an increase in the concentration of white blood cells and a decrease in the concentration of packed cell volume, hemoglobin, and sedimentation rate. It reached (4 cells / mm), (42.5), 13.2 g/dl. (28mm/hr respectively). (Compared to the control group (7.5 cells/mm), (43.5%), g/dl 14.5) (20mm/hr respectively). The study showed the results of the biochemical parameters of people infected with the parasite and diabetes, an increase in the concentration of glucose, cumulative sugar, C-reactive protein, high-density lipoproteins for cholesterol, urea, cholesterol, a slight increase in the concentration of uric acid, and a slight decrease in the concentration of creatinine with no significant difference, and it reached mg / dl, (14.9) mg/dl, (8.9%), (224) mg/dl 1) 0.9mg/dl, (4.6mg/dl), (164mg/dl), (35 mg/dl), respectively, compared to a group control in which it was 1.2mg/dl (30mg/dl (5.5mg/dl (5.5), (93mg/dl), 0.95mg/dl), (4.3mg/dl (160mg/dl)) (respectively and for diabetics only The study found an increase in the level of glucose, cumulative sugar, C-reactive protein, high-density lipoproteins for cholesterol, uric acid, cholesterol and urea, and a slight increase in the concentration of Creatinine (179 (5mg/dl) (1.1 mg/dl) (10.7 mg/dl) (8.6%) (225.6 mg/dl)(0.76mg/dl), (334mg/dl mg/dl), respectively

1. Introduction

Infection with intestinal parasites is considered an important medical problem in most developing countries (Sayyari et al., 2005). The parasite G. Lamblia is a single-celled primary flagellate that can infect different species in the animal kingdom such as some mammals, humans, birds, reptiles and domestic animals. Pets (2005, Appelbee et al.) and a common pathogen between humans and animals due to the presence of a genotype of Giardia in humans and other animals (2009).Monis et al. The G.lamblia parasite infects the upper part of the small intestine represented by the duodenum and the jejunum for reasons related to the host, its nutritional status, bowel motility, and parasite virulence, as well as a decrease in antibody levels (globulinsgamma (IgG) because it increases the risk of infection. Giardiasis (Mcallister et al (Giardiasis. 2005).(backpacker's diarrhea) and beaver fever (Feng & Xiao, 2011) (Beaver fever) .

Diabetes mellitus (DM) is defined as a group of metabolic disorders that end in hyperglycemia and result either from a defect in the secretion of the

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hormone insulin, the action of insulin, or both (2010, American Diabetes Association). Diabetes occurs as a result of the deficiency of B cells in the pancreas. This is known as type 1 diabetes mellitus (TIDM), or when the body is unable to use that substance effectively, and this represents diabetes mellitus. Noninsulin-dependent diabetes mellitus (NIDDM) Type 2 diabetes mellitus (T2DM) The hormone Insulin is a hormone that regulates the level of sugar in the blood. Diabetes is a common disease that occurs due to lack of control of the level of glucose in the blood, which Over time, it leads to significant damage affecting the structure and functions of body tissues. The main symptoms leading to suspicion of diabetes and high glucose levels are severe thirst. d Polydipsia with increased urination, polyuria, weight loss, and sometimes in the blood, the patient feels hungry (Gianani, 2005).

The study aims to

Studying the relationship of infection between protozoan intestinal parasites in patients with diabetes by determining some hematological indicators (, , ESR, HD w) and biochemical (CRP, Hbal Bug)(HDL-CS.cr B.urea Chol

2. Materials and Methods of Work

Place of study

The current study was conducted in the hospitals of Babylon and its suburbs, and in some private laboratories. Collect blood samples Blood samples were collected by drawing (5 ml) of venous blood using a wine syringe after sterilizing the area with 70% ethanol. Quietly for 5 minutes (to prevent blood clots) in order to study the blood parameters, which included the percentage of hemoglobin (Hb) and the volume of compressed blood.P. C.V and the differential and total number of leukocytes in the blood. As for the second group, (3 ml) of blood is placed in a test tube and left to clot for half an hour, then the samples are centrifuged using a centrifuge at a speed of 3000 cycles.
per minute for 10 minutes. Serum was isolated from other blood components using a micropipette and placed in tubes of 10 ml capacity. Then the tubes containing the serum were kept at 20 degrees until tests were performed on them.

Experiment design

123 samples were collected and divided as follows:
1 - 50 people who are not infected with any of the two variables (diabetes or the Giardia lamblia parasite) and are considered positive control. Blood tests were performed in the samples of the infected and the control group.
2- 50 people with diabetes only, without a parasite, and it is considered a negative control
3-15 subjects infected with Giardia lamblia without diabetes were negative controls
4-8 patients with giardia lamblia and diabetes

Samples examination methods

1- Visual examination

This method included a complete description of the stool in terms of form and consistency as soft, watery, or well-formed, as it gives a description of the type of parasitic organisms present in it. Moldy or rotten as the smell of arsenic.

2-microscopy

Direct examination method

Faecal samples were examined with the naked eye before microscopic examination, and the examination included consistency, color, and whether it contained blood or mucus, and whether it contained fatty materials or not (Al-Hadithi and Habash, 2000). The microscopic examination was carried out using the Direct Smear Method, where a drop of normal saline was placed on one side of a clean, dry glass slide and another drop of Lugol's iodine solution on the other side, then a small amount of excrement was taken with a wooden stick. Wood stick) and mixed well a drop of physiological solution and iodine solution, then put a slide cover without causing air bubbles, then the samples were examined by light microscopy under the two forces(Singh et al., 2009) 40X,10X

3. Blood tests

WBC blood count count

The blood cell counter method and Turkey fluid dilution were used to calculate the total white blood cell count.(Brown 1976)

Measurement of erythrocyte sedimentation rate (ESR)

Westergreens' method for calculating erythrocyte sedimentation rate (Brown 1976) and Weintraub's method were used Wintrobe and results were expressed in hour/ml

PCV - Compressed cell volume measurement

Capillary tubes, a microcentrifuge, and a hematocrit reader were used to measure and determine the percentage of hematocrit..(Brown 1976)

Hemoglobin Hb level assessment

A hemoglobin meter and Dr Abkin's solution were used as a dilution solution to estimate the concentration of hemoglobin in a blood sample (Sood, 1992).
Biochemical examinations

Glucose concentration

The concentration of glucose in blood serum was estimated by using the enzymatic method (Trinder, 1969), which included the use of analysis kits prepared by the Spanish company Bio systems, and the results were expressed in milligrams. Another method of measurement is the 5010 Photometer Boehringer Mannheim(The Summit Book, 2015).

Estimation of cumulative sugar

The cumulative concentration was estimated by

Cobas integra plus (400) assay Absorbance photometry - C-reactive protein test
This test depends on the immunological interaction that occurs between the human C-reactive protein and the corresponding antibodies to the human CRP antigen attached to the latex particles, as the negative reaction indicates that there is no Agglutination occurs, but the positive reaction indicates the occurrence of visible and clear adhesion of latex particles on the slide,2005), rider et al. There are two ways to conduct the test (Al-Qimma Book, 2015): 1. Qualitative Assay. 2 . semi-quantitative assay). - Estimation of the concentration of high-density lipoprotein cholesterol in blood serum The concentration of high-density lipoprotein cholesterol in blood serum was estimated using Photometer 5010 Behringer Mannheim (Summit Book, 2015).

Determination of uric acid in blood serum

The concentration of boric acid in blood serum was estimated using the Photometer Boehringer Mannheim 5010 method.(The Summit Book, 2015).

Estimation of creatinine concentration in blood serum

There are two methods for calculating creatinine clearance (Summit Book, 2015) and they are:

1 Cockcroft-Gault method
2 Arithmetic method

Estimation of cholesterol concentration in the blood serum

Cholesterol concentration was estimated using the Boehringer Mannheim 5010 Photometer method (Summit Book, 2015)

Estimation of urea concentration in blood serum

The urea concentration was determined using the Boehringer Mannheim 5010 Photometer method(Summit Book, 2015)

4. 4 Results

Percentage of infection with Giardia Lamblia parasite by gender the results of the current study showed a discrepancy in the rates of parasite infection between males and females. Males (20%) as shown in Table No. (1)

Table (1) Percentage of Giardia Lamblia infection by gender

Gender	Patients		Control	
	Thr number	Percentage%	Thr number	Percentage%
Males	3	20	15	30
Females	12	80*	35	70
Total	15	100	50	100
T arithmetic		4.8		
T tabular p<0.05		1.96		
* This sign means that there are significant differences				

Percentage of infection with Giardia lamblia parasite according to age groups

The results of the current study showed that there is a variation in the rates of parasite infection in different age groups. The results of the statistical analysis showed that there were significant differences at the probability level (P>0.05), as the highest infection rate was within the age group (less than ten years), reaching 46.7%, and the lowest infection rate. Within the age group (40-31) years, it was 6.7%, as shown in Table (2).

Table (2) Percentage of infection with Giardia Lamblia parasite according to age groups

Age Categories	The Patients	Percentage%
1 – 10	7	46.7*
11 – 20	3	20
21 – 30	2	13.3
31 – 40	1	6.7
40 <	2	13.3
Total	15	100
Chi-square arithmetic	12.3	
Tabular chi - square	9.49	
The percentage of infection with Giardia lamblia parasite according to gender for people with diabetes.		

The results of the current study showed a discrepancy in the percentage of infection with the parasite between males and females, as it was observed that there were significant differences at the probability level (P>0.05) in the percentage of infection between the genders , where the percentage was for females (62.5%) And it was in males (37.5%) (as in Table No. (3)

Table (3) Percentage of infection with Giardia Lamblia parasite, according to gender , for patients with diabetes

Gender	Patients		Control	
	Thr number	Percentage%	Thr number	Percentage%
Males	3	37.5	20	40
Females	5	62.5*	30	60
Total	8	100	50	100
T arithmetic		5.5		
T tabular p<0.05		1.96		

Comparison of patients with diabetes who carry the parasite Giardia lamblia with controls based on blood parameters:

The results in Table No. (4) indicated that there were significant differences (P < 0.05) in the hemoglobin concentration of diabetic patients carrying Lamblia parasite. When compared with the control group, the average hemoglobin concentration for patients was (12.3) gm/dl compared to the control group, which had a value of (14.5) gm/dl.
The results in Table No. (4) indicated that there were significant differences (P < 0.05) in the hematocrit concentration of diabetic patients carrying Lamblia parasite. When compared with the control group, the average hematocrit concentration of patients was (40%) compared to the total control dose, which amounted to (43).
The results indicated in Table No. (4) that there were significant differences (P < 0.05) in the concentration of white blood cells in patients with diabetes who were carriers of Lamblia parasite. When compared with the control group, the mean white blood cell concentration was (9.2) cells/cu.mm compared to the control group, whose value was (7.5).cells/cu.mm.
The results indicated in Table No. (4) that there were no significant differences (P < 0.05) in the average concentration of the erythrocyte sedimentation level for patients with diabetes who carried the G. Lamblia parasite when compared with the control group, as the average concentration of the erythrocyte sedimentation level for patients (28) mm/h compared to the control speed, which amounted to (20) mm/h.

Table No. (4) Comparison of patients with diabetes who carry the parasite Giardia lamblia with controls based on blood parameters

Blood Parameters	Control M±SD	Diabetes Patients M± SD	Diabetes and E. Histolytica infection together M±SD	LSD P<0.05
Hb.	14.5 ±1.5	13.2 ± 1.8	*12.3±1.3	1.2
PCV	43 ± 2.1	42.5 ± 5.5	*40 ± 5	2.3
WBCs×103	7.5 ± 1.3	*9.4 ± 0.9	9.2± 2.2	1.1
ESR	20 ± 5.3	*28 ± 3.1	*28 ± 11.2	3.9

Comparison between patients with diabetes mellitus and Giardia lamblia parasite and patients with diabetes only with control based on biochemical parameters

The results indicated in Table No. (5) that there were significant differences (P < 0.05) in the concentration of blood sugar in patients with diabetes who were carriers of Lamblia parasite. When compared with the control group, the average concentration of blood sugar for patients was (224) gm/dl compared to the control group, which had a value of (93) gm/dl.
The results indicated in Table No. (5) that there were significant differences (P < 0.05) in the concentration of HbA1C in patients with diabetes who carry the G. Lamblia parasite when compared with the control group, as the average HbA1C concentration for patients was (8.9%) compared to the control group, which amounted to value (6).
The results indicated in Table No. (5) that there were significant differences (P < 0.05) in the concentration of cholesterol for patients with diabetes who carried the G. Lamblia parasite when compared with the control group, as its concentration rate for patients was (164) gm/dl compared to the control group, which Its value was (160).gm/dl. .
The results indicated in Table No. (5) that there were no significant differences (P < 0.05) in the concentration of S.H.D.L in diabetic patients carrying Lamblia parasite. When compared with the control group, as its average concentration for patients was (1) gm/dl compared to the control group, which had a value of (1.2) gm/dl.
The results indicated in Table No. (5) that there were significant differences (P < 0.05) in the concentration of C.R.protein in patients with diabetes who carried the G.lamblia parasite when compared with the control group, as the average concentration of C.R.protein for patients was (14.9) gm/l compared with control group, which amounted to (5.5) gm/l.
The results in Table No. (5) indicated that there were significant differences (P < 0.05) in the urea concentration of diabetic patients carrying Lamblia parasite. When compared with the control group, as its average concentration for patients was (35) gm/dl compared to the control group, which had a value of (30) gm/dl.
The results indicated in Table No. (5) that there were no significant differences (P < 0.05) in the creatinine concentration of patients with diabetes who carried the G.lamblia parasite when compared with the control group, as the average concentration of creatinine for patients was (0.9) gm/dl compared with the control group. Which amounted to (0.95) gm/dl.
The results indicated in Table No. (5) that there were no significant differences (P<0.05) in the concentration of S.uric acid for patients with diabetes who carried the G.lamblia parasite when compared with the control group, as its concentration rate for patients was (4.6) gm/dl compared to With the control group, which amounted to (4.3) gm/dl

Parameters Biochemical	Control M±SD	Diabetes Patients M± SD	Diabetes and E. Histolytica infection together M±SD	LSD P<0.05
Bl.Sugar	93 ±21.5	*225.6 ± 139	224±13.5	11.5
Hba1c	5.5 ±1.5	8.6 ± 2.3	*8.9 ± 0.3	2.2
Bl.Urea	30 ± 6.1	33.4 ± 9	*35± 7.2	3.7
S.Creatinine	0.95 ± 0.2	*0.76 ± 0.1	0.9 ± 0.3	0.1
S.Uric acid	4.3 ± 1.1	*5 ± 0.8	4.6 ± 1.3	0.6
S.Cholesterol	160 ±15.4	*179 ±53.7	164±22.1	6.8
S.H.D.L	1.2 ± 0.1	1.1 ± 0.2	1±0.2	
C.R.protrin	5.5 ± 3.1	10.7 ± 5.9	*14.9±6.3	4.1

5. Discussion

1: The relationship of sex to infection with Giardia lamblia

The results of the current study showed a discrepancy in the rates of infection with the parasite between males and females . Females (80) were in males (20), where these results are consistent with previous studies that showed that females are much higher of males. 2020, Tangi et al., 2016) (Chandi & Lakhani) another study that is consistent with the current study conducted by. 2021, Almugadam et al), where it was shown that females are more likely to be infected with intestinal parasites than males (0.027 = OR=3.213; P. value): the relationship of age group to infection with Giardia lamblia

As for the lamblia parasite, the highest infection rate was within the age group (less than ten years), reaching 46.7%, and the lowest infection rate was within the age group (31-40) years, and it was 6.7. These results agree with the study conducted by Ghenghesh et al 2016. Where it was revealed that the age group of 7 years are more likely to be infected with intestinal parasites than the age group of more than 10 years. Whereas 2022 Khlaf reported that the highest frequency (38.16) of infection with intestinal parasites was within the age group of 10-11 years. The reason for the high rates of infection with this parasite in the age groups (1-10) years is due to the ignorance of this group and their lack of knowledge of hygiene rules.

And the fact that children at this age are more mobile and active, as well as the children's habits of playing in polluted soil in swimming pools or sewers with polluted stagnant water, as well as eating food and ice cream from street vendors, or the reason is due to the acquired immunodeficiency among these children. (2016. Anim-Baidoo et al.). Another study, from the city of Derna, examined the presence of intestinal parasites in children.Primary schools, aged 12 years, were selected by random sampling . Methodology using the master list of eight schools Kassem & Sadaga 3 - The relationship of sex to infection with the Giardia lamblia parasite and diabetes Males (37.5). These results are consistent with the results of a published study, which showed that the frequency of females with diabetes was (60.5%) compared to males with diabetes, whose frequency was (39.5) 2011. Another recent study showed that intestinal parasites are higher in females. Diabetic females (63.6) than males (36.4) (Waly et al. 2021).. While Mohtashamipour et al. 2015 found that females with diabetes had a higher risk of infection with intestinal parasites compared to males value = 0.029, OR = 3.06; P) The current study contradicts the results of the study conducted in southern Ethiopia, which revealed that there were no statistically significant differences between the group of people with diabetes and healthy people according to gender and age groups (0.05) 2018. Alemu et al. This contradiction may be due to the nature of life in other societies in terms of hygiene and following a healthy system that avoids high sugar and enhances immunity against infections. Relationship of hematological parameters of patients with diabetes mellitus, Giardia lamblia, and diabetes mellitus Just The results indicated that there were significant differences (P < 0.05) in the hemoglobin concentration of diabetic patients carrying Lamblia parasite. . This means that the hemoglobin concentration of diabetic patients is significantly lower when compared with the control group. The results of the current study agree with the results of the study conducted in Iraq by Mohammed et al 2022, where it was found that the hemoglobin concentration of patients with diabetes who are carriers of intestinal parasites was 1.47 + 11.50 compared to 1.22 ± 12.67 for the control group and at the level of probability that it causes continuous blood loss in the stool. Rather than actual blood consumption by the parasite (Steketeen 2003) in another study by Dravany et al. 2019 who reported a significant difference in hemoglobin level with a mean decrease in TIDM patients with opportunistic intestinal parasite infection as opposed to other TIDM patients. Those with a non-opportunistic intestinal parasitic infection. The results of this study indicated that hematocrit concentration was significantly lower in diabetic patients carrying intestinal parasites compared to the control group. These results are consistent with the study conducted in Iraq & hussein AL-MOUSAWI Mohammed et al., 2022) NEAMAH (2021) who found the same results as the current study. The current results may explain, according to our information, that intestinal parasites bleeding in the intestines, which leads to a decrease in PCV as blood volume is lost in relation to WBCS, the study showed that the concentration of white blood cells is significantly higher in diabetic patients carrying intestinal parasites compared to the control group The current results agree with the study conducted in Najaf (2021 hussein AL-MOUSAWI & NEAMAH), where he found results 0.001. A possible explanation for the

decreased hemoglobin concentration could be the possibility that parasites interfere with the body's ability to absorb nutrients, including iron, which is an essential component of hemoglobin. This can lead to iron deficiency and consequently a decrease in hemoglobin levels (Shaw & Friedman 2011). Also, blood loss mostly occurs due to the parasite triggering blood clotting, which leads to similar. The reason for the increase in white blood may be due to the response of the immune system to care for pathogens, especially eosinophil cells, which play a crucial and important role in eliminating parasites. These cells move in large numbers from the bloodstream to the site of infection with the parasite to stick to the surface of the parasite and start attacking and killing the parasite (Behm & Ovington 2000).) Infection with intestinal parasites has a very significant effect on blood parameters, as this is the reason for the increase in the values of white blood cells and the decrease in the values of .. and H. The parasites in the intestines of patients cause problems in the digestive system and thus cause the absorption process, especially since the stages in which the parasites attach with intestinal villi (2004,CANTOS et al.) Regarding WBCS, the study showed that the concentration of leukocytes is significantly higher in diabetic patients carrying intestinal parasites compared to the control group. The present findings are consistent with the study conducted in (2019). Hussein et al. found the same results. The possible cause of the elevated ESR upon parasite infection may be that the presence of parasites in the body triggers an immune response, leading to the release of cytokines and other mediators of the immune system. This could be To cause inflammation and lead to ESR increase.

Relationship of biochemical parameters of diabetes mellitus and Giardia lamblia

Diabetes only The results of the current study indicated that there were significant differences ($P < 0.05$), which means that the concentration of blood sugar in diabetic patients carrying G. Lambli parasite was significantly higher when compared with the control group. These results agree with the study conducted by (Sisu et al. 2021), where it was reported that 89.5% of diabetic patients carrying G. Lamblia parasite were significantly higher when compared with the control group (19.5).

Another study conducted by Nemanze et al. 2022 reported that there was a statistically significant difference in FBS, between diabetic patients (78.4 ± 197.2 = FBS (mg/dL) and non-diabetic group, FBS $P < 0.001$, 93.4 (1.93) (= 80.5 ± 12 F The effect of diabetes on attracting intestinal parasite infection may be explained by several reasons listed in several studies which reported that hyperglycemia and dyslipidemia activate inflammatory mediators by ultimately participating in enhancing the chance of developing this type (from DM Rehman & Akash 2016) and reducing Immune defense against parasites (Machado et al. 2018. These factors could explain the lower rate of parasite infection in type 1 individuals, even considering the lower age range of this group of individuals (mostly children and young adults), which would be more susceptible than The epidemiology of type D predominantly elderly people for intestinal parasite infection (Machado et al. 2018).

The results of this study indicated that there were no significant differences between diabetic patients carrying intestinal parasites and the control group according to the concentration of cholesterol in the blood. These results are not consistent with the study conducted by (Das 2002, et.al), which reported that cholesterol is a major component of eukaryotic membranes and has an important role in membrane synthesis and function. The biosynthesis of the membrane in Giardia requires cholesterol. Because Giardia G.lamblia is unable to produce and produce cholesterol, it acquires cholesterol from the upper small intestine (Das et al 2002). These processes increase the supply of fatty acids in the liver, which stimulates elevated triglyceride synthesis in the liver 2013 Ma'ani & Jabir. A possible explanation for these differences is that the pathogenesis of cholesterol metabolism and parasite infections is complex and may not be fully understood. It is possible that other factors, such as diet, genetics, and lifestyle, play a larger role in cholesterol levels. The response to parasite infection and cholesterol levels can also vary greatly from person to person. Some individuals may have high cholesterol levels despite being infected with parasites, while others may not experience any changes. The results of the current study contradict (Khlaf. 2022), which revealed that there was a significant decrease in the level of cholesterol concentrations 23.1 162.7 in the parasite-infected group compared with the control group.

The results of this study indicated that the concentration of C.R.protein in patients with G. Lamblia parasite carriers were significantly higher when compared with the diabetic control group. These results are consistent with the study conducted in Baghdad governorate (Ezzy et al 2015 (1) where similar results were found. The reason behind increased CRP is that Giardia can damage intestinal tissue, causing increased CRP as the body tries to repair the damage (Siddiqui et al 2021).

A significant positive increase in the level of C-reactive protein, which may be due to several reasons, one of which may be the large number of infective stages of G. lamblia that were ingested, and the long duration of infection causes an increase in the activity of hepatocytes. Increased acute phase reactant synthesis including CRP. On the other hand, tissue damage caused by attachment of the parasite to the mucosal surface may represent a persistent stimulus for hepatocytes to increase CRP synthesis as an innate defense mechanism that cooperates with increased phagocytic activities of mucosal macrophages in addition to mucosal IgA as a humoral defense against infectious stages (Safi, 2012. G. lamblia) The progression of the immune response plays a role in the negative correlation

between the acute phase of G.lamblia-induced diarrhea and the level of CRP. Innate immunity characterizes molecules on the lamblia membrane. (Gorczynski . 2012)The results of the current study indicated that the level of B.Urea in patients with diabetes who were carriers of intestinal parasites were significantly higher when compared to the control group. These results are consistent with the results of the study conducted in Iraq 2022 (Mohammed et al) which found that the level of B.Urea for patients with diabetes who are carriers of intestinal parasites was (1.635.48 mmol/L against 1.37 ± 4.98 and at a probability level of 0.010 the possible explanation for the high The level of urea in the blood may be due to the reasons listed (Mange et al. 1997). Where it was shown that chronic diarrhea has a strong relationship with dehydration as a result of infection with intestinal parasites, which leads to an imbalance in body fluids, especially intracellular and extracellular fluids, causing hypovolemic shock. Blood and organ damage, in particular, with a high blood urea level called uremia due to pre-kidney disease. The results of the current study indicated that there were significant differences ($P < 0.05$) in the concentration of HbA1C in patients with diabetes who carried the G. Lamblia parasite, and when compared with the control group, the results of this study agree with Drawany et al. P>0.001) present higher in TIDM patients with opportunistic intestinal parasitic infection than in other diabetic children with non-opportunistic intestinal parasitic infection There are many reasons why HbA1C may increase, including Parasitic infection can lead to malabsorption of nutrients and decreased insulin secretion, leading to increased HbAlc levels. Parasitic infections can also alter hormone levels in the body, leading to changes in glucose metabolism and increased HbA1c levels. Khanna et al., 2022 (Rajamanickam et al., 2019).

Although there were no significant differences between diabetic patients carrying intestinal parasites The level of control in relation to S.H.D.L., however, there are many studies that have shown that there is a significant increase in and total Serum HDL in patients with Glamblia compared to a control group (Feingold & Grunfeld 2022)(,.Al-Hadraawy et al., 2016) (Pirillo et al 2015)The possible explanation for the lack of significant differences may be that other factors that affect SHDL such as diet, exercise, genetics, and general health may also play a role in determining HDL levels, making

It makes it difficult to determine the direct impact of infection with intestinal parasites. The study reported that there were no significant differences between patients with diabetes who were carriers of intestinal parasites and the control group with respect to S. creatinine and S. uric acid. There may be several reasons that prevented a significant relationship, and either there are many factors that can affect creatinine and uric acid levels, such as diet, exercise, medications, and underlying medical conditions, or the duration of the parasite infection may not be long enough to affect creatinine levels. and uric acid.

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