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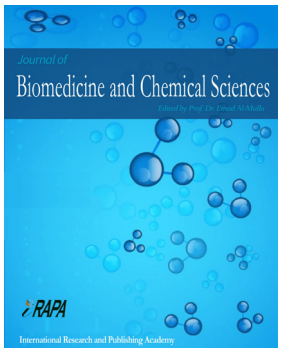

Effect of Parasite Ascaris lumbricoides on Some Haematological Parameters and Level Concentrations Interleukin 10 and 22

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ABSTRACT

Ascaris lumbricoides is a parasite that alters the immune response of the host. This study aims to determine the serum levels of interleukin-10 (IL-10) and interleukin-22 (IL-22) in some patients and their relationships to the severity of infection. The current study also aims to study some blood parameters of patients infected with the Ascaris lumbricoides. Patients were referred to this laboratory for testing from Al Furat General Hospital in Al-Najaf Province, Al Sader General Hospital, Al-Zahra Maternity and Paediatrics, and Al-Hakeem Hospital. Formol-ether concentration and Kato-Katz thick smear techniques were used to examine stool samples. The results show a significant increase (P0.05) in serum interleukin-10 and interleukin-22 in ascariasis patients compared to the healthy group. The results revealed a significant increase (P0.05) in iron level concentration in ascariasis patients and a significant decrease (P0.05) in Hb, PCV, and RBCs count.

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INTRODUCTION

Infection with gastrointestinal parasites has been identified as a serious public health issue in tropical countries worldwide (Oliveira et al., 2019; Degarege et al., 2014). The large roundworm Ascaris lumbricoides is a human pathogen with a global distribution. It is estimated that A. lumbricoides alone causes 1.5 billion infections (Varyani et al., 2017). These infections are associated with substantial morbidity (Alelign et al., 2015).). According to reports, the prevalence of soil-transmitted helminth (STH) parasites is commonly high in conditions of poor hygiene and sanitation, with children being more affected than adults (Srivastava et al., 2012).). A. lumbricoides infects the mammalian host orally through ingestion of infective ova (Zheng et al., 2012; Shang et al., 2010). Ascariasis is common in areas where defecation occurs in open latrines and stool is thrown around haphazardly.

As a result, contamination of food and water is extremely common (Tarafder et al., 2010). Anaemia is frequently linked to parasitic diseases like malaria and hookworm infections (Eraky et al., 2014). Hookworms cause anaemia by causing iron deficiency through chronic intestinal blood loss. The hookworms Ancylostoma duodenale and Necatoramericanus cause approximately 0.2 mL and 0.15 mL blood loss per day, respectively. Hookworms also produce anticlotting factors (such as coagulase, a blood thinner), ensuring continuous blood flow and high intensity. Trichuris and Ascaris infections have been linked to poor nutritional status (Lamberton & Jourdan, 2015). IL-22 belongs to the cytokine family IL-10, which also includes IL-19, IL-20, IL-24, and IL-26 (Hansen et al., 2019). IL-22 communicates via a heterodimeric receptor complex composed of two subunits, IL-22R1 and IL-10R2 (Hepworth et al., 2012). While IL-10R2 is

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found on almost all cell types, IL-22R1 is only found on the surfaces of non-hematopoietic cells such as epithelial cells, hepatocytes, and keratinocytes (Reina Ortiz et al., 2011). Because of the limited expression of IL-22R1 on non-hematopoietic cells, IL-22 can specifically target innate cell populations in tissues such as the gastrointestinal tract, liver, skin, kidneys, and lungs (Allen & Maizels, 1997).

MATERIALS & METHODS

Specimens Gathered Between July 2021 and June 2022, 32 samples were collected from patients and 20 healthy people who attended clinics at AL-Sadder Teaching Hospital and AL-Hakeem Hospital in AL-Najaf province. Stool samples were collected from male patients and placed in clean, wide-mouth specimen bottles. Five millilitres of blood were also drawn from the same patients via vein puncture, four millilitres were placed in specimen tubes, and 30 minutes were spent at room temperature. After that, the samples were centrifuged at 3000 rpm for 5 minutes (Backman/counter, Germany) to separate the serum and collected in other sterile tubes; each serum sample was divided into two parts and kept in deep freeze at -20Co until used for iron and ferritin determination. The remaining one millilitre of blood was drawn into a tube containing anticoagulated EDTA (Abott/Jordan) and used to determine the haematological parameters Hb, PCV, and RBCS.

Iron Serum (Colorimetric Test)

The colorimetric test method was used by cypress diagnostics biochemistry analyser to estimate serum iron levels using RANDOX reagents, code HB012. (RANDOX Kit, U.K).

Parasitological Stool Examination

On alternate days, helminth eggs were examined using the spontaneous sedimentation method (Hofmann) in three stool samples preserved in formalin 10%. To calculate the number of eggs per gram of feces, the Kato-Katz method was used (OPG)

Analysis of IL-10,22 in Supernatant Fluids

IL-10 and IL-22 levels were determined using a sandwich ELISA performed according to the manufacturer's instructions. The detection limit for the assay was 19.5 pg/mL; values less than this limit were assigned the detection limit value.

Statistical Analysis

The information was entered into the Microsoft Excel program. The Chi-square test was used to evaluate and analyse the results to find associations between the prevalence of intestinal parasite infections and risk factors in infected and non-infected children. The statistical significance level was set at p 0.05.

RESULTS & FINDINGS

The Relationship Between Ascariasis Patients' IL-10 and the Control Group

Figure 1 shows a comparison of ascariasis patients and a healthy group, with a significant increase (P0.05) in serum interlukin-10 (IL-10) concentration in ascariasis patients (355.23 0.221 vs. 64.54.21 Ug/dl in the healthy group.

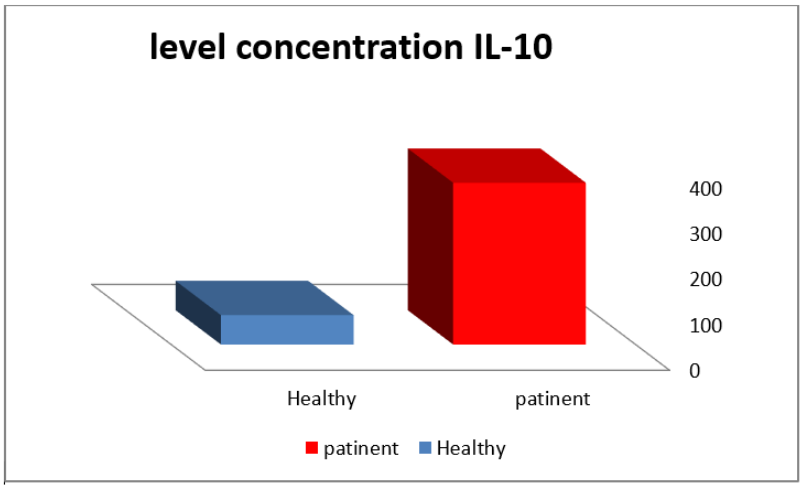

Fig.1. comparison between level concentration of IL-10 of ascariasis patients and Healthy group

Interlukin-22 (IL-22) Levels in Ascariasis Patients and Healthy Controls

Figure 2 shows a comparison of ascariasis patients and a healthy group, with a significant increase (P0.05) in serum interlukin-22 concentration in ascariasis

patients (562.564 2.791 vs. 100.88 0.923 in the healthy group.

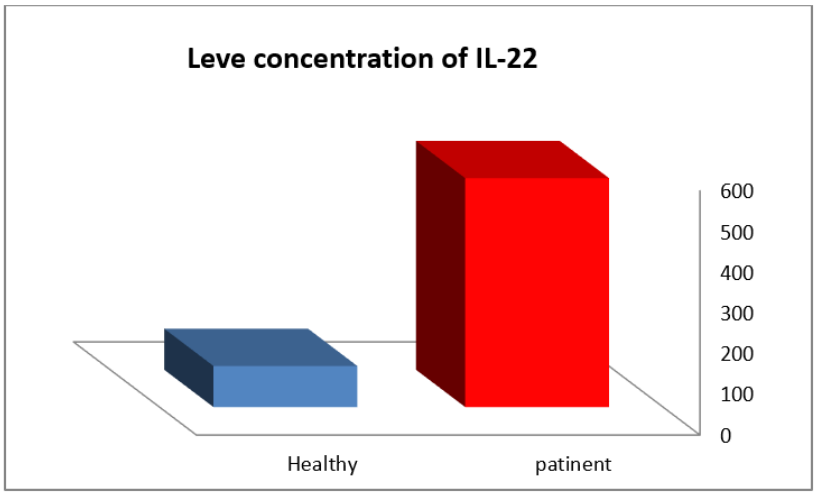

Fig. 2. comparison between level concentration of IL-22 of ascariasis patients and Healthy group

Comparison of the Iron Levels in Ascariasis Patients and the Healthy Group

The comparison between ascariasis patients and healthy group revealed a significant increase (P0.05) in iron level concentration in ascariasis patients (22.793 0.322 Ug/dL compared to healthy group 266.321 4.113 Ug/dL.

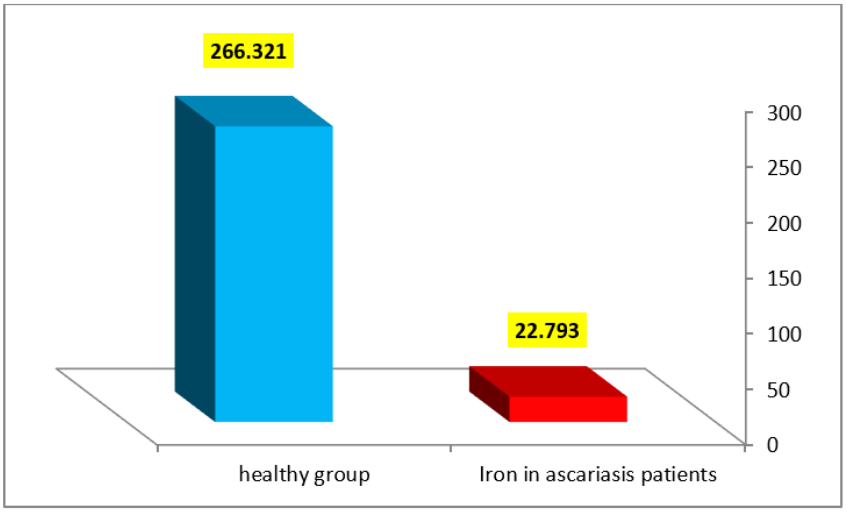

Fig. 3. Comparison Between Level Concentration Iron of Ascariasis Patients and Healthy Group

Haematological Parameters

Ascariasis patients' Hb, PCV, and RBC counts significantly decreased (P 0.05) when compared to healthy group members, with ascariasis patients' values being 9. 548 0.581 gm/dL in comparison to healthy group members' values of 13.548 0.160 gm/dL, 29.871 (%) in comparison to healthy group members' values of 37.997 (%), and 3.755 106.

Table1

Comparison of laboratory parameters in ascariasis patients and Healthy group

	Patients	Controls	P-value
Gender(male/female)	32	20	0.730
WBC ($\times 10^9$/L)	6.39 (4.88, 8.96)	6.29 (5.61, 7.28)	0.937
RBC ($\times 10^{12}$/L)	3.87 ± 0.80	4.53 ± 0.29	0.000
HGB (g/L)	103.44 ± 24.96	135.48 ± 8.31	0.000
MCV (fL)	86.88 (73.42, 91.78)	90.04 (87.51, 92.22)	0.000
MCH (pg)	28.36 (22.96, 30.40)	29.91 (29.04, 30.82)	0.000
MCHC (g/L)	325.05 (312.50, 332.15)	332.80 (329.00, 335.80)	0.000
PLT ($\times 10^9$/L)	255.30 (209.62, 320.10)	232.30 (206.70, 260.90)	0.002
NEU ($\times 10^9$/L)	3.64 (2.59, 5.33)	3.58 (2.93, 4.13)	0.327
LYM ($\times 10^9$/L)	1.36 (1.06, 1.87)	2.15 (1.86, 2.40)	0.000
EOS ($\times 10^9$/L)	0.35 (0.15, 0.72)	0.11 (0.07, 0.20)	0.000

Discussion

The current findings showed a significant decreased in RBCs count, a significant decreased in Hb concentration, and a significant decreased in the concentration of PCV in patients with A. lumbricoides infection compared to the control group. This result may have been caused by haemolysis of RBCs by the A. lumbricoides worm, which may have caused a decrease in the number of RBCs. The haemolysis of RBCs may also have caused a decrease in the concentration of Hb. Anaemia and parasite infestation are related by a pathogen physiologic process (Jourdan et al., 2018; Khalid et al., 2017). By lowering iron absorption from the gut, directly sucking blood, and interfering with iron metabolism both directly and indirectly, the helminthic infection leads to anaemia shortage (Karagiannis-Voules et al., 2015; Cooper et al., 2000; Mathison & Pritt, 2018). Protozoa affect anaemia by destroying the intestine's mucosal structure, which affects how well micronutrients like iron are absorbed. These methods all impact the nutritional state of the hosts, which consequently changes their immune system (Wright et al., 2009; Goddey et al., 2010).

Our results are consistent with IL-10&IL-22, with the family playing a major part in immunization against helminth infection. Eosinophils are activated by IL-10 and IL-22. serve as a bridge between the parasite and the nearby co-activated cell on the parasite's surface. Inhibition of IL-10 upstream in immunological illness of A. lumbricoides infection during lung migration phase is caused by a significant effect on IL-22 levels among the screened patients (Goddey et al., 2010). Clinical records of this Ascaris pneumonia secondary stage show cellular infiltration, serous exudate, bronchial irritation, and eosinophilia, which is known to start in Loeffler.

CONCLUSION

In many parts of the world, where poor sanitation makes infection and reinfection more likely, parasitic helminth infestation is a widespread condition affecting billions of people, in individuals with ascariasis, intestinal parasite infection had a deleterious impact on haematological profiles and was a reliable indicator of anaemia. In patients infected with the Ascaris parasite, intestinal parasitic infection resulted in a considerable reduction in the levels of HGB, HCT, MCV, MCH, and MCHC. Deworming can be an effective method of getting rid of these worms in ascariasis patients to minimized anaemia.

Competing Interest

The authors had no competing interests.

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