ORIGINAL ARTICLE

Role of IL-10 and IL-12 in pathogenesis of *Leishmaniadonovani* in children under twelve years in Kirkuk city

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ABSTRACT

Aim: To determine the levels of IL-10 and IL-12 in children infected with *Leishmaniadonovani*.
Methods: This study was conducted in Kirkuk governorate in the period from January to June 2018 and included 33 children suffering from acute visceral leishmaniasis, as they were from one to 12 years old, and Yen were attending pediatric clinics in the city of Kirkuk during that period.
Results: The study also included forty healthy children (uninfected) who were reviewing health centers for the purpose of vaccinations, in order to ensure that they did not complain of any symptoms or signs of any disease. Affected children, or meaning persons suspected of being infected, were selected based on clinical signs and diagnostic tests. The study included the collection of blood samples from all children in the study, therefore, for the purpose of investigating antibodies to the parasite, and the levels of IL-10 and IL-12 were detected using the ELISA.The study showed that majority of children with suspected VL infection (96.97%) were positive to *Leishmaniadonovani* IgM antibodies (by ELISA) while no one of the control group have positive result. The study was highly significant (P <0.01).The study demonstrated that most children with VL infection were belonged to age group 4-6 and 7-9 years and the male gender was the predominant through infected children.The study showed that IL-10 was elevated more frequently in children with *Leishmaniadonovani* infection as compared with healthy control children (62.12±6.81 *versus* 10.14 ± 1.19 pg/ml).The study showed that IL-12 was reduced significantly in children with *Leishmaniadonovani* infection as compared with healthy control children (6.33±2.19 *versus* 122.18±3.69 pg/ml).
Conclusion: It was concluded that there was a significant relation of visceral leishmaniasis with IL-10 and IL-12.
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Keyword: *Leishmaniadonovani*; Kala azar, IL-10; IL-12; Visceral leishmaniasis

INTRODUCTION

Various factors contribute to the pathogenesis such as phagocytosis. Depending on the host immune response, the amastigotes are either killed or allowed to multiply inside the macrophages[1]. Like leprosy, the immunology of leishmaniasis is complex and bipolar. It has two extreme poles, each which is characterized by one of the two type of T helper subset responses, i.e., T helper 1 or T helper 2 responses[2]. In most cases of visceral leishmaniasis there is a strong correlation between an elevation of the level of many cytokines and the development of acute infections with this parasite, particularly interferon gamma and interleukin 2[3]. Where the scientific evidence in the mothers of immunological medical books indicates that the stimulation of helper lymphocytes type A indicates an increase in the levels of manufacture of interleukin two and four in people with visceral leishmaniasis in addition to a significant increase in the level of retardation factor type alpha[4]. And what works to keep the parasite's dormant phase the amastigote (which leads to keeping the immune system in a state of complete recovery to face the situation out of control, infesting the parasite in cases in which the parasite can return to the motor phase[5]. The recovery of patients infected with the parasite regardless of whether or not treatment was given[6]. This was evident in studies that indicated that enhancing the immune role of children with black fever and who do not have high levels of the aforementioned cytokines prolonged their treatment periods and developed These cases lead to yellowing of the blood and an increase in the level of bilirubin and their liver enzymes[7]. On the other hand, the excessive increase in the levels of inflammatory interleukins may lead to several defects in the immune response leading to a worsening of the disease, especially in children with comorbidities such as diabetes type 1 and high degrees Heat as bacteremia, for example[8]. The aim of the study was to determine the levels of IL-10 and IL-12 in children infected with *Leishmaniadonovani*.

MATERIALS AND METHODS

This study was conducted in Kirkuk governorate in the period from January to June 2018 and included 33 children suffering from acute visceral leishmaniasis, as they were from one to 12 years old, and who were attending pediatric clinics in the city of Kirkuk during that period.

The study also included forty healthy children (uninfected) who were reviewing health centers for the purpose of vaccinations, in order to ensure that they did not complain of any symptoms or signs of any disease. Affected children, or meaning persons suspected of being infected, were selected based on clinical signs and diagnostic tests. The study included the collection of blood samples from all children in the study, therefore, for the purpose of investigating antibodies to the parasite, and the levels of IL-10 and IL-12 were detected using the ELISA technique (Koma-Biotech, Co, USA). The study also involved taking complete information from conditions such as living situation and age.

RESULTS

The study showed that majority of children with suspected VL infection (96.97%) were positive to *Leishmaniadonovani*IgM antibodies (by ELISA) while no one of the control group have positive result (P <0.01), (Table 1).

The study demonstrated that most children with VL infection were belonged to age group 4-6 and 7-9 years and the male gender was the predominant through infected children (Table 2).

The study showed that IL-10 was elevated more frequently in children with *Leishmaniadonovani*infection as compared with healthy control children (62.12±6.81 *versus* 10.14 ± 1.19 pg/ml) (Table 3).

The study showed that IL-12 was reduced significantly in children with *Leishmaniadonovani*infection as compared with healthy control children (6.33±2.19 *versus* 122.18±3.69 pg/ml) (Table 4).

The study showed strong negative correlation between IL-10 and IL-12 in children with *Leishmaniadonovani*infection (r: -0.73) (Figure 1).

Figure 1: Correlation between IL-10 and IL-12 in children with *Leishmaniadonovani* infection

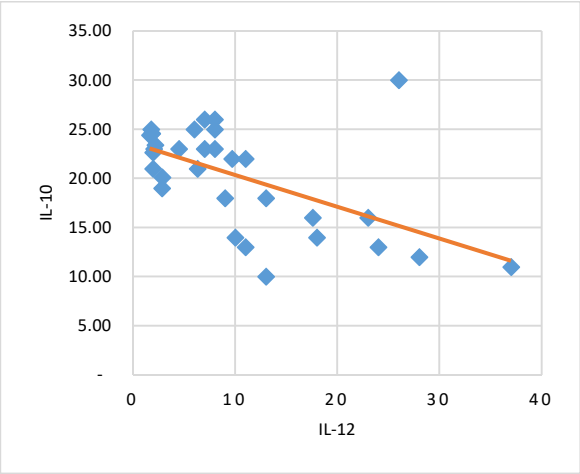

Table 1: Results of *Leishmaniadonovani* IgM antibodies ELISA

Results of ELISA	Suspected patients	Control group
Positive	32(96.97%)	0
Negative	1(3.03%)	40(100%)
Total	33(100%)	40(100%)

Table 2: Distribution of children with VL according to age and sex.

Age groups (years)	n	Male	Female
1-3	6	4 (66.67%)	2 (33.33%)
4-6	10	6 (60%)	4 (40%)
7-9	13	7 (53.85%)	6 (46.15 %)
10-12	3	2 (66.67%)	1 (33.33%)
Total	32	19 (59.37%)	13 (40.63%)

Table 3: Level of IL-10 in VL patient and the control group

IL-10 level (mpg/ml)	VL patients	Control group
N.	32	40
Mean	62.12	10.14
SD.	6.81	1.19

Table 4: Level of IL-12 in VL patient and the control group

IL-10 level (mpg/ml)	VL patients	Control group
N.	32	40
Mean	6.33	22.18
SD.	2.19	3.69

DISCUSSION

The study showed that majority of children with suspected VL infection (96.97%) were positive to *Leishmaniadonovani* IgM antibodies (by ELISA) while no one of the control group have positive result. The study was highly significant (P <0.01). The study demonstrated that most children with VL infection were belonged to age group 4-6 and 7-9 years and the male gender was the predominant through infected children. In agreement with these finding, Ali[8] indicated in similar study that, His study added that a high percentage of the infected children who complain of the symptoms of VL infection had positive tests for antibodies IgM compared to the non-infected children who do not complain of any symptoms and they are the control group. The study also added that children under three years of age are more susceptible to injury compared to children older than that, and that there is no significant difference between males and females in the case of visceral leishmaniasis, and there is no doubt that these results are very similar to the results that we have reached in our study. As the most important factor in the spread of this disease in children is the spread of sand flies that transmit the parasite in homes and infects children of these ages and there is no difference, especially that there is no difference in the immune response in children who are less than five years how much our study as mentioned by several sources in this field[6,7]. Interleukin 10 and Interleukin 12 are interleukins that are taken by the immune system and are released and secreted in various disease states, including infections, bacteria, viruses and parasites, especially leishmaniasis in children and adults in several regions of the world, as indicated by a study as indicated by studies[9]. s different studies have shown the last of Interleukin-10, the level increases significantly in children with Leishmaniasis regardless of their immune status, as Interleukin 10 is one of the immune factors that lead to the suspension of the immune action against viruses, bacteria, parasites and parasites [(10-12)]. Other studies show that interleukin 12, and the opposite of action with interleukin 10, is upset. It is higher in people with black fever, especially interleukin 10, and it is higher in people with acute infections in stomach diseases such as viral hepatitis, bacteremia and other parasitic infections[13]. Where Interleukin 10 works to suppress immune cells and phagocytes in the body by inhibiting the action of Th2 lymphocytes, which leads to suppression of the cellular immune pathway in people[14,15]. In Mann Interleukin 12, it has been found to be lower in people with black fever compared to people, and this indicates that the immunity of people with black fever at a level that leads to a deterioration of their condition and the spread of the parasite to them and the deterioration of their health, as the parasite reaches the liver and bone marrow and leads to an interaction between reduced IL-12 and elevated IL-10[16,17]. Other studies also demonstrated that Interleukin 12 has two dimensions to reduce other diseases other than parasites such as virus infections and

bacteremia due to the influence of the immune system by infection in the liver and spleen and high levels of Interleukin-10, which leads to suppression of the work of immune cells and leads to a decrease in the production of antibodies towards the black fever parasite in Injured children[18,19,20]. This was evident in studies that indicated that enhancing the immune role of children with black fever and who do not have high levels of the aforementioned cytokines prolonged their treatment periods and developed These cases lead to yellowing of the blood and an increase in the level of bilirubin and their liver enzymes[21,22,23].

CONCLUSION

It was concluded that there was a significant relation of visceral leishmaniasis with IL-10 and IL-12.

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Conflict of Interests: The authors of this paper declare that they have no personal or financial association with foundations or organizations that would inappropriately bias the content of this study and therefore declare that there is no conflict of interests.

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Ethical Approve: We declare that the study does not need any ethical approval.

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