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# The relationship between the level of interleukins and some trace elements in the incidence of cutaneous leishmania

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**Abstract**

The current study is conducted between 13/12/2020 and 5/5/ 2021 Samarra General Hospital reviewed patients with symptoms of dermal leshmaniasis were collected. The results of this study show that there are moral differences in some of the studied variables. The results show that 30. 13% of infected people carry IgG and 69.87% carry IgM in the serum.Immunological tests have shown a moral rise at a morale level P < 0.05 in the rate of leukocyte IL- 10 in blood serum for dermatologic lysmania CL at 160.9 ± 44.4 pg/ml and 78.6 ± 20.3 pg/ml in uninfected people. The results show a moral rise of the TNF-α tumor necrosis factor at a moral level of p < 0.05 in the Lemania group compared to the healthy group, where the average injury was 154.5 ± 35.8 pg/mL in return. The control group recorded 99.2 ± 17.0 pg/Ml. The results showed a difference in the concentration of elements in the serum of people with leishmaniasis compared to the control group .the concentration of the selenium element 88.8 ± 13.5 ug/dl either its concentration in the control group 154.2 ± 16.2 ug/dl, The high copper concentration in infected people was ± 26.4 148.9 ug/dl while its There was no decrease in zinc level in the control group if the ratio is 98.9±19.1 ug/dl, The zinc element decreased its concentration in the serum of infected people to 90.8 ± 13.7 ug/dl compared to healthy 111.1.± 19.2 ug/dl.

## Introduction:

Leishmaniasis is one of 17 important tropical diseases classified by the World Health Organization (WHO) and prevalent primarily in low-income countries. The disease is endemic in 98 countries, but about 75% cases of lichmaniasis in humans have been recorded in 10 countries, Afghanistan. Algeria, Brazil, Colombia, Costa Rica, Ethiopia, Iran, Iraq, Peru, Syria [1].

Human beings develop this disease when their immunity is weak and thus fails to destroy the parasite. [2] when the parasite is injected into the skin by the vector insect crosses different defensive cells into the injection position of Macrophages, Monocytes, Neutrophils and Dendritic cell, where Cellular immunity plays a key role towards lichmania parasites and T cell plays a key role in controlling parasite reproduction compared to Humanal immunity, whose role is secondary to infection [3].

Leishmania has a lot of health problems and despite its seriousness and rapidity, it remains neglected globally [4]. Leishmania parasites spread and continue through a complex life cycle between (Phlebotemuos ssp.) and its vertebral havens caused by protozoa parasite are compulsory to intract within living cells and shared with humans and zoonotic animals and transmitted from one host to another by biting a female sandfly [5].

The Selenium is a vital component of human body health and has several antioxidant functions including protecting cells from oxidation and sustaining the immune system, which is essential for reproduction and growth and is obtained from outside the body to perform several functions within the living body [6]. Copper enters many physiological functions of the human body such as hemoglobin manufacturing and absorption of iron maintains arterial elasticity [2]. while zinc contributes to wound healing, tissue regeneration and immune response against parasites and is a fairly reactive metal but a strong reductive factor [7].

**Materials and working methods**

**Collection of blood samples**

Five ml of venous blood was withdrawn using a dry and sterile medical prop placed in coagulation-free test tubes in order to obtain serum by centrifuge at a speed of (3000) cycle / 15 minutes, after which the serum was withdrawn by micropipette, the serum was divided into Eppendorf tube with a volume of 1 ml per tube, and the models were kept frozen until immunological and biochemical tests were performed.

**Immunological tests**

Serological tests were conducted on 83 samples of patients with cutaneous leishmaniasis, 20 microliters of serum were used to detect the presence of IgM, IgG antibodies using detection strip and adding the diluted solution, then the result appeared after 15 minutes. As for the measurement of the levels of interleukin 10 and the tumor necrosis factor TNF - α with ELIZA technology

**Trace elements test**

Serum Selenium determination is estimated using a special Chinese-made kit using the spectrophotometer. The concentration of copper in the serum has been measured based on the direct tonal method according to the manufacturer. As for the Zinc, the Colorimetric determination) of zinc in serum test was used to determine zinc in the serum, which was manufactured by the Italian company. from the Italian company LTA S.R.l. – Via Milano ,15 /F

**Conclusions Immunological tests results**

**•Immune test results**

At the time of collecting 83 blood samples of people with leishmaniasis and conducting serological tests, this study showed that 69.87% of people with IgM and 30.13% had IgG antibodies as in Table 1.

**Table 1.** Percentage of the appearance of immune globins in people with leishmaniasis

| Percentage | Number | Antibodies |
|---|---|---|
| %30.13 | 25 | IgG |
| %69.87 | 58 | IgM |
| 100% | 83 | Total |

The high level of IgM is an indicator of the onset of the injury and then starts to decline and shows a clear rise in the level of the antigen IgG in this period and then decreases or may remain for a period of time (8) A parasite infection causes humoral immune stimulation that is responsible for the production of antibodies IgG, IgM, which is a factor in the diagnosis of this parasite in addition to cellular immunity. Researchers attribute the rise in immune chloropenes to multisolar stimulation of B- cells that is stimulated by parasitic-free substances that act as mutations of B- cells. The counting of cholopenes is increasing by increasing parasitic numbers as a result of the stimulation of B cells, resulting in increased production and construction of immune chloropenes and thus higher levels during infusion.

Those who have indicated that high antibodies to IgG indicate most cases of leather lymphoma are chronic. Some studies have confirmed that dermal lymphoma can lead to [2] These results are consistent with what the Draghy came up with at the height of IgM in the serum of dermatologists as it conforms to the production of large numbers of polyclonal antibody types for B lymphocytes generating specialized antibodies to infection [8].

Interleukin-10 results

The results of the current study have showed a significant increase at the level of significance $P<0.05$ in interleukin IL-10 in the blood serum of people with skin leishmaniasis CL amounting to 160.9 pg / ml and 78.6 pg / ml in uninfected people as in table (5-4), and these results are consistent with the findings of [9]. in the high rate of IL-10 in people with leishmaniasis in Kirkuk Governorate, as in Table 2

**Table 2**. Effect of Skin Leishmaniasis on Interleukin 10

| Infected Group<br>Mean ± S.D<br>N=83 | Control Group<br>Mean ± S.D<br>N=25 | The studied variables<br>Immunological tests |
|---|---|---|
| 160.9 ±44.4* | 78.6 ±20.3 | IL- 10 |

While these results differed with [8] in the decrease in the level of IL-10 in infected males and females in the city of Samarra at 29.6 pg/ml and 29.8 pg / ml respectively, interleukin IL-10 is an important anti-inflammatory cellular kinetic and is produced from cells that have a role in adaptive immune such as Th1 and Th2, CD8 and B cells are also produced from cells that have a role in innate immune such as DC dendritic cells, natural killer cells NK, macrophage cells, mast cells, neutrophils and eosinophils, so the production of IL-10 from different immune cells demonstrates the importance of the regulatory role it plays.. It plays an important role in determining and regulating the immune response, with some studies suggesting that the interleno-10 leukemia is multidirectional, and acts as a regulator that maintains a balance in the inflammatory response [10].

**Trace elements results**

The studied results have showed a difference in the level of elements in the serum of people with skin leishmaniasis compared to healthy people, where they have showed a decrease in the level of the element selenium 88.8 ug/dl while its level in healthy people is 154 ug /dl and also observed a rise in the level of copper in the infected by 148.9 ug/dl while its level decreased in healthy people by 98.9ug/dl while the zinc element decreased its level in the serum of infected people to 90.8ug/dl compared to healthy people who had a zinc level 111.1 UG/DL Through statistical analysis it was found that there are significant differences at the level of $p<0.05$ between the results of the infected and the healthy as in Table 3.

**Table 3.** Levels of trace element in people with dermal lichmania and control samples

| Trace elements | Control Group Mean ± S.D N=83 | Control Group Mean ± S.D N=25 |
|---|---|---|
| selenium Se | 88.8± 13.5 * | 154.2± **16. 2** |
| copper Cu | 148.9±26.4 * | 98 .9±**19. 1** |
| Zink Zn | 90.8± 13.7 * | 111.1± **19. 2** |

* means there is a significant difference at the level of $p<0.05$

Mean ±S.D: Mean Arithmetic ± Standard division

N: Number of samples

In their study on levels of selenium, zinc, copper and iron in people with dermal chimanya in southwestern Iran, the results also showed a decrease in the level of silenum 83.05 ug/dl, zinc 86 .51ug/dl and an increase in the level of copper 1 .11ug/dl [11] in their study on the assessment of the chemical and biological From the results that have emerged and that have turned out to be consistent with some of the studies that have dealt with the side of trace elements and their relationship to skin lymphoma, these results are consistent with [12] levels of serum of people with dermatopathy, which showed a moral increase of copper level of 777.01 ppm and a moral decrease in selenium and zinc level respectively of 8.6 ppm and 0.4 ppm.

These marked changes in the level of trace elements in infected people are only part of the response to the acute stage of injury. These changes are usually reflected in the low concentrations of these elements in the serum as a type of host immune response in the host's defense strategies against leishmania [14].

The decrease in zinc level in people with dermal lichmania is due to the effect of methalothionine being built in the liver and other tissues, where methalothionine has a super-high binding of zinc atoms within the circulation and stimulating this binding process by the cellular motor (IL-1) Interleukin-1 which is high in the person with GLashmania parasite

Changes in the level of metallic metabolism are associated with the immune response against injury. The 90% percentage of copper found in the blood is inventory in the form of ceruloplasmin protein. Therefore, elevations in copper level can be observed in many injuries that have an effect on this protein [15].

## Conclusion

Cutaneous leishmaniasis has rised of some immune variables such as interleukin-10, and it turns out that most sufferers carry IgM immune chlippins, followed by IgG. The researchers stress the need to take dietary supplements rich in minerals to resist any type of parasitic infection because it plays a role in strengthening the immune system. Furthermore, it has been concluded from the research that the level of trace elements has been clearly affected by the infection of the Leishmaniasis.

## References


1. WHO. (2020). "Leishmaniasis and Leishmania/ HIV Co infection." Fact Sheet No. 116.
2. Alvar J, Velez ID, Bern C, Herrero M, Desjeux P, Cano J, Jannin J, den Boer M (2012) Leishmaniasis worldwide and global estimates of its incidence. PLoS ONE 7(5):35671
3. Kuru, M. (2018). The Effect on Serum Mineral Levels of Acute Septic Mastitis and Clinical Mastitis in Cows . Erciyes Üniversitesi Veteriner Fakültesi Dergisi , 15 (1) , 11-16 . Retrieved from https://dergipark.org.tr/en/pub/ercivet/issue/36501/414116
4. Almayouf, M. A., El-Khadragy, M., Awad, M. A., and Alolayan, E. M (2020). The effects of silver nanoparticles biosynthesized using fig and olive extracts on cutaneous leishmaniasis-induced inflammation female balb/c in mice. Bioscience Reports, 40(12), BSR20202672 .
5. Boroujeni A.M., Aminjavaheri M., Moshtaghian B.,and Momen A AZ.(2013). Reevaluating leishmanin skin test as a marker for immunity against cutaneous leishmaniasis. Int. *J.Dermatology. 52(7):828–830.*
6. Patiño-Herrera R, Catarino-Centeno R, Robles-Martínez M, Zarate MG, Flores AJC, Perez E. ( 2018 ). Antimycotic activity of zinc oxide decorated with silver nanoparticles against Trichophyton mentagrophytes. Powder Technology, 327: 381–391.
7. Grüngreiff, K., Reinhold, D., & Wedemeyer, H. (2016). The role of zinc in liver cirrhosis. Ann J hep, 15(1), 7-16
8. Fricker-Hidalgo, H.; Bailly, Sl;.Brenier-Pinchart, M.-P.; Dard, C.; Jean D.; Coston, A.-L.; Garnaud, C. and Pelloux, H. (2020). How estimate time of infection with Toxoplasma gondii in pregnant to women Use of specific IgG and IgM kinetics by 7 techniques on 691 sera Diagn. Microbiol Infect Dis, 96(4): 114987.
9. de Lima, C. M. F., Magalhães, A. S., Costa, R., Barreto, C. C., Machado, P. R., Carvalho, E. M., ... & Carvalho, L. P. (2021). High anti-leishmania IgG antibody levels are associated with severity of mucosal Leishmaniasis. *Frontiers in cellular and infection microbiology*, *11*, 652956.
10. Barros-Gonçalves, T. D. D., Saavedra, A. F., Silva-Couto, L. D., Ribeiro-Romão, R. P., Bezerra-Paiva, M., Gomes-Silva, A., ... & Pinto, E. F. (2021). Increased levels of cortisol are associated with the severity of experimental visceral leishmaniasis in a Leishmania (L.) infantum-hamster model. *PLoS Neglected Tropical Diseases*, *15*(11), e0009987.
11. Abdallah, A. A. M., Abdelrahman, M. M., Attia, H. M. A. A. S., Hafez, A., Anwar Rashed, S., Amin, Y. A., & Hemdan, S. B. (2022). Decreased Serum zinc, selenium, and vitamin E as possible risk factors of hepatic fibrosis in non-alcoholic fatty liver disease. *Nutrition and Health*, 02601060221103032.

12. Wasan .A. H. AL-Darrajy (2021) the spread leishmania tropica parasite and its effect on some immunology and hormonal aspects in the city of Samarra. thesis, University of Samarra.
13. Lopes, L., Brito, L. M., Bezerra, T. T., Gomes, K. N., CARVALHO, F. A., & Chaves, M. H. (2018). Silver and gold nanoparticles from tannic acid: synthesis, characterization and evaluation of antileishmanial and cytotoxic activities. *Anais da Academia Brasileira de Ciências*, *90*, 2679-2689.
14. Mhammed K Kamil Al-Hassani, Hadi M Hamza Al-Mayali (2020) Evaluation of some biochemical levels in patients with Cutaneous leishmaniasis serum and their relationship with antioxidant enzymes .EurAsian J Biosci 14 (1), *1999-2006, 2020 journal/asian-pacific-journal-of- tropical-disease Pages S445-S448*
15. Zarebavani, M., Dargahi, D., Einollahi, N., Dashti, N., Mohebali, M., & Rezaeian M. (2012). Serum levels of zinc, copper, vitamin B12, folate and immunoglobulins in individuals with giardiasis*. Iranian journal of public health, 41(12), 47 .*

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# العلاقة بين مستوى الإنترلوكينات وبعض العناصر النزرة في الإصابة بداء الليشمانيات الجلدي

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**الخلاصة:**
اجريت الدراسة الحالية بتاريخ 2020/12/13 ولغاية 2021/5/5 تم جمع عينات من مرضى المراجعين لمستشفى سامراء العام ممن لديهم اعراض الاصابة باللشمانيا الجلدية تم سحب 5مل من دم المصابين واجريت عليهم الاختبارات المناعية الكيميوحيوية ومقارنتها بعينات السيطرة. وقد اظهرت نتائج هذه الدراسة ان هناك فروقا معنوية في بعض المتغيرات المدروسة واظهرت النتائج ان 30.13% من المصابين يحملون الكلوبين IgG و69.87% يحملون الكلوبين IgM في مصل الدم. اظهرت الاختبارات المناعية ارتفاع معنوي عند مستوى معنوية $P<0.05$ في معدل البين ابيضاض IL- 10 في مصل الدم للمصابين باللشمانيا الجلدية CL اذ بلغت 160.9 ±44.4 بيكوغرام/ مل و78.6 ±20.3 بيكوغرام/مل في الاشخاص غير المصابين, تبين من خلال النتائج حصول ارتفاع معنوي لعامل النخر الورمي TNF-α عند مستوى معنوية $p<0.05$ لدى مجموعة الاصابة باللشمانيا مقارنة مع مجموعة الاصحاء حيث بلغ متوسط الاصابة 35.8 ± 154.5 بيكوغرام /مل بالمقابل سجلت مجموعة السيطرة 17.0 ± 99.2 بيكوغرام /مل . اظهرت النتائج اختلافا في تركيز العناصر في مصل المصابين باللشمانيا الجلدية مقارنة مع مجموعة السيطرة حيث اظهرت انخفاضا في تركيز عنصر السيلينوم 88.8± 13.5 ug/dl اما تركيزه في مجموعة السيطرة 16.2 ± 154.2 ug /dl ,ارتفاع تركيز النحاس لدى المصابين بلغ 26.4± 148.9 ug/dl بينما انخفض تركيزه في غير المصابين الى 19.1±98.9 ug/ dl , عنصر الزنك انخفض تركيزه في مصل المصابين الى 13.7 ± 90.8 ug/dl مقارنة بالأصحاء 19.2± 111.1 ug/dl .