ORIGINAL ARTICLE

Evaluation of Hematological Findings among Patients with Cutaneous Leishmaniasis

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ABSTRACT

Background: Sudan is a big country with a high frequency of Leishmania of both types, visceral and cutaneous, with several clinical manifestations. However, little is known about the hematological profiles in patients with cutaneous Leishmania (CL) in this population and other ethnic groups.
Aim: To estimate the complete blood count (CBC) in the Cutaneous Leishmania of Sudanese patients.
Methods: In a case-control study three hundred participants were recruited, comprising 200 carriers and 100 healthy individuals. In each case, five ml of venous blood was taken into an EDTA container and the CBC estimated using a hematology analyzer. The SPSS version 21 of Sysmex was used for data analysis.
Results: The majority (57%) of Leishmania patients were male and a significant CBC increase was observed in the lymphocyte. Mixed WBCs and platelet counts for Leishmania patients were (34.2 ±11.7; 11.6 ±4.6 and 243.3 ±76.6), compared to the control (28.54±9.02; 9.6±4.2 and 198.9±72.2), with *p values* (0.000; 0.000 and 0.000), respectively.
Conclusion: The higher count of lymphocytes, mixed WBCs and platelets, suggests an elicited cellular immunity reaction in Leishmania patients. We believe that more studies into haemogram parameters are necessary.
Keywords: Blood Indices, Hematological, Leishmaniasis.

INTRODUCTION

Leishmaniasis is a group of mammalian diseases caused by the genus Leishmania, which are introduced during blood-feeding by phlebotomus (infected female sand flies)[1]. So far, about 20 species are known to cause Leshmaniasis and the disease manifests itself predominantly in men[2]. Leishmaniasis has a high mortality rate and is endemic in 98 countries with around 1.3 million new cases reported annually. Mortality is between 20,000 and 40,000 every year[3].

More than 90% of cases with Leishmaniasis have been reported in different ethnic groups Cases occur in Sudan, India, Bangladesh, Nepal and Brazil[4]. Leishmaniasis occurs in three types - cutaneous, mucocutaneous and visceral[5], arising from infection of macrophages within the dermis at first, the naso-oropharyngeal mucosa and throughout the reticuloendothelial system. For all previous three types, infection ranges from symptomatic to severe[6]. Cutaneous Leishmaniasis (CL) is the commonest and least fatal form of the disease and it is identified by ulcerative skin lesions[7].

Elimination of Leishmania effectively relies on co-ordination of action between different parts of the immune system. The war between parasite eradication and disease establishment partly depends upon the capability of Leishmania to evade host immunity, from bloodstream promastigote entry following a sand fly bite, to its final mammalian cellular target as amastigote. Elements of host defence, crucial for Leishmania eradication, comprise components of the both immune systems, namely innate and adaptive[8].

CL is classified as a chronic granulomatous infection of the skin, presentation judged according to the severity of the host's immune response. The response of cellular immune to the disease is important and crucially significant[9]. The phagocytic cells are key aspects of both antimicrobial and tumoricidal immune responses[9, 10].

Neutrophil host cells initially spread at the site where Leishmania infection occurs within a few time (i.e. hours) of infection by a sand fly bite[11]. They engulf Leishmania promastigotes[12], producing an array of microbicidal factors against the infection[13]. Additionally, neutrophils have a protective role against most kinds of Leishmania infection[14], although outcomes are reliant on strain, host genetic background and the apoptotic or necrotic state of the neutrophils[14, 15].

Lymphocytes have a crucial role in adaptive immune response to infection of Leishmania, primarily through cytokine elaboration, activating or dampening macrophage antiparasitic activity. It is documented that T cells have a crucial role in immunity to different strains of Leishmania[16].

Routine CBC parameters are essential in several settings, comprising assessment of systemic inflammation, diagnosis, and treatment of disease. Recent studies report changes in circulating blood cell counts and blood cell indices in cancers, inflammatory disease and infection. Hematological alterations show close correlation with severity and prognosis of disease[17, 18]. The evolution of blood morphology has often been discussed in Visceral Leishmania (VL) patients, but it has not been widely

investigated in CL[19]. Thus, this study was performed to estimate the blood count in CL patients.

METHODS

Three hundred participants were recruited here, with two hundred cases with CL and one hundred healthy individuals as a control. After obtaining written informed consent, blood samples were drawn. Five ml. of venous blood was collected from each participant into an EDTA container and CBC was undertaken for each specimen using the haematology analyzer, Sysmex. Data was expressed as percentage and differences in variable mean levels between the two groups were tested by Student's *t*-test.

RESULTS

The findings demonstrated that 57% and 43% of patients were males and females respectively (Table 1). In the context of Age, the highest proportion of Leishmania infection was among 12–29 yr olds (47%), followed by 30-47 olds (34%) and then 48-65 olds (19%) (Table 2).

Our study found a significant count increase in lymphocytes, mixed WBCs (monocytes, basophils, and eosinophils) and platelets among CL patients compared to the control (Table 3). Mean values of lymphocyte count were (34.2±11.7) for patients and (28.5 ±9.0) for the control and mean values of mixed WBCs were (11.6 ±4.6) for patients and (9.6 ±4.2) for the control. Platelet count mean values in our study were (243.3 ±76.6) for patients and (198.9 ±72.2) for the control (Figure 1).

Table 1: Gender frequency distribution among the patients and control subjects.

Subjects	Gender		Total Frequency (%)
	Female(%)	Male (%)	
Control	50 (50%)	50 (50%)	100 (33.3%)
Patient	85 (43%)	115 (57%)	200 (66.7%)
Total	135	165	300 (100%)

Table 2: Distribution of patients stratified by age

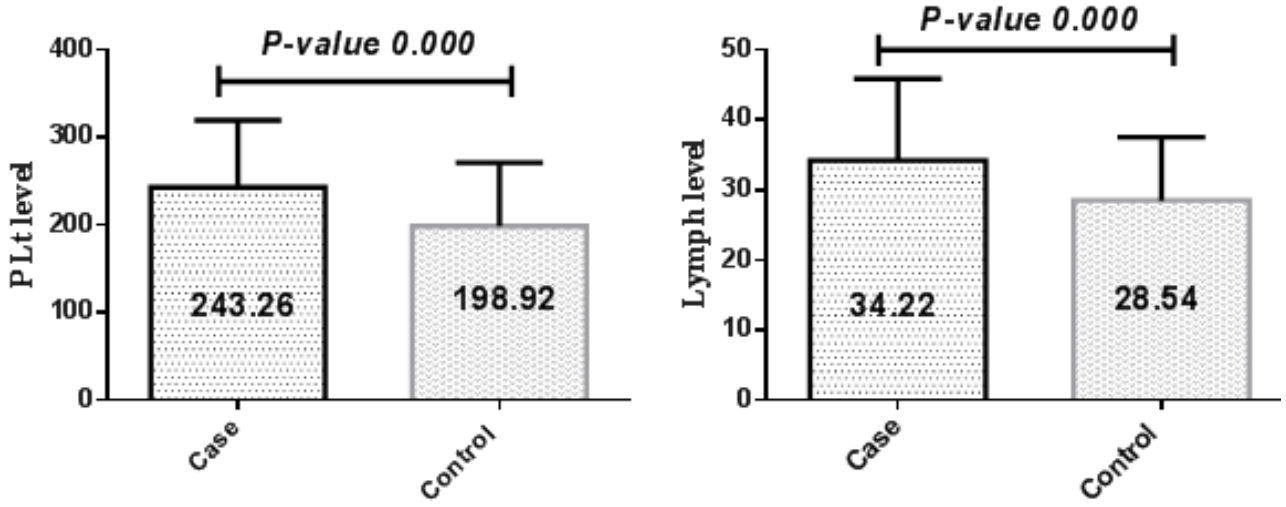
Variable	Frequency (%)
12-29 Years	94(47.0)
30-47 Years	68(34.0)
48-65 Years	38(19.0)
Total	200(100.0)

Table 3: Mean of study parameters in case group versus control group.

Parameters	Patients M (±SD) N=200	Control M (±SD) N=100
Hb	13.5 (1.6) [(c)]	13.22 (1.7)
TWBCs	6.2 (2.3) [(c)]	6.8(2.6)
Neut	51.2 (14.5) [(c)]	53.1 (15.8)
Lymph	34.2 (11.7) [(a)]	28.5 (9.0)
Plt	243.3 (76.6) [(a)]	198.92±72.24

Key: Statistical significance is shown in superscript parenthesis and determined by comparison of the patient group with the control group. (a) = 0.00, (b) = < 0.05, (c) = > 0.05. M= Mean; SD= standard deviation.

Fig. 1: Results of platelet and lymphocyte in the study population



DISCUSSION

This higher male incidence contrasts with findings of Al-Rumaidh and coworkers in Iraq[20] and Sula and coworkers in Turkey[21], where Leishmania was more prevalent amongst female patients.

P Al-Ghazaly J and co-workers stated that blood picture evolution has often been discussed in VL patients but it has not been extensively investigated in CL patients [19]. In the present study Hb, WBC and neutrophil blood counts were of no significant difference in CL patients. Our Hb result disagrees with Abdul Ghani *et al*., in Yemen [19] and Al-Rumaidh*et al.* in Iraq[20]. Additionally, our TWBC results agree with Al-Rumaidh *et al.*[20] but disagree with Abdul Ghani *et al*[19].

Contrary to Sula *et al* in Turkey[21], our study also showed a significant elevation in TWBC count in patients with CL compared to the control (*p value* =0.00), suggesting this as an indicator of the infection. With regard to neutrophil count, the present study also disagrees with

Sula *et al* but concords with Al-Rumaidh*et al.*[20], in finding only an insignificant difference between CL patients and the control.

Our study found a significant count increase in lymphocytes, mixed WBCs (monocytes, basophils, and eosinophils) and platelets among CL patients compared to the control. Mean values of lymphocyte count were (34.2 ±11.7) for patients and (28.5 ±9.0) for the control and mean values of mixed WBCs were (11.6 ±4.6) for patients and (9.6 ±4.2) for the control. The latter finding disagrees with Al-Rumaidh and co-workers [20], who noticed no significant differences in WBC count and the former finding is in disagreement with Sula et al. [21] , who reported a significant decrease in the lymphocyte count.

Platelet count mean values in our study were (243.3 ±76.6) for patients and (198.9 ±72.2) for the control. These results disagree with Abdul Ghani *et al.*[19], Al-Rumaidh *et al.*[20], and Sula *et al*.[21], where no significant difference in platelet count was observed.

Differing results from our study [19-21] can be attributed to the recent diagnosis of CL patients with normal neutrophil counts and possibly no co-infection. Herein, the difference in lymphocyte count could suggest polarization of the adaptive immune response in Leishmaniasis patients.

Differing levels of virulence among Leishmania species (or strains) and their elicited immune response substantiates our results and aligns with findings into CL in Yemen[19], Iraq [20] and Turkey [21].

Hematological profiles in patients with VL were conducted in some populations of Algadaref in Sudan[22], New Delhi in India[23] and Sanaa in Yemen[19]. These studies all reported the most common laboratory abnormalities as thrombocytopenia and leucopenia. Additionally, Al-Ghazaly *et al*. reported VL patients as having anemia, neutropenia, eosinopenia, and pancytopenia.

CONCLUSION

Sudanese patients with Cutaneous Leishmania had higher counts of lymphocytes, mixed WBCs and platelets, suggesting an elicited cellular immunity reaction. We believe that more comprehensive studies are necessary in clarifying its hemogram parameters.

Funding: None.

Conflict of Interest: The authors declared no conflict of interest.

Acknowledgment: The authors would like to thank participants.

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