

## Epidemiological study of Visceral Leishmaniasis in Diyala Province, Iraq

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### Abstract

The study has been done in the Al-Batool hospital in Baqubah Town, Diyala province on the patients admitted to hospital in the period from January-2015 till January-2016. The aim of the study, is to study the epidemiology and the source with pathogenesis of the visceral Leishmaniasis also the variations about the distribution of the disease between all districts of diyala province. Data were collected from (280) subjects infected with by Visceral Leishmaniasis in the hospital, the study reveal that the highest incidence of disease among the children less than one year of age (43%) and the children in less than two years of age (42%).the incidence was higher in females than in male (female to male ratio is about (1.14: 1). The highest incidence of the disease appeared in patients admitted to the hospital during the period from (January to April) of the (81.3%). In addition the highest incidence of infections was in patients living in Al khalis district (28.9%). The results of the present study showed that the death rate was (7.85%), (4.28% among males and 3.57% among females), but the percentage according to death is (10.8%) in age bellow (12 years). The best accurate method of diagnosis is by using Immune Fluorescent Assay Test (IFAT). (69.6%).

**Key words:** Diyala province, Immune Fluorescent Assay Test. (IFAT). Kala-Azar: Visceral Leishmaniasis. VL: Visceral Leishmaniasis. Septicemia. T.B: Tuberculosis.

## دراسة وبائية عن داء اللشمانيا الاحشائية في محافظة ديالى، العراق

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الخلاصة

اجري هذا البحث في مستشفى البتول التعليمي للأطفال في مدينة بعقوبة على المرضى الراقدين للمدة من كانون الثاني/2015 ولغاية كانون الثاني/2016. حيث تم جمع المعلومات الخاصة بالمرض من (280) حالة مرضية في المستشفى. وجد باناه اعلى نسبة إصابة بالمرض بين الأطفال دون سن السنة الواحدة من العمر (43%) ونسبة (42%) بين الأطفال دون السنة الثانية من العمر. ان نسبة الإصابة بالمرض بين الاناث الى الذكور هي 1:1,14 وهذا يعني انه الاناث اعلى نسبة في الإصابة بالمرض. الهدف من الدراسة هو دراسة وبائية داء اللشمانيا الاحشائية , والمصدر مع التأثيرات المرضية لداء اللشمانيا الاحشائية وكذلك معرفة مدى انتشار المرض بين اقصية محافظة ديالى. وان اعلى نسبة اصابة بالمرض بين الأشهر (شباط الى نيسان) من السنة وبنسبة (71,9%). واعلى نسبة اصابة بالمرض هي بين سكان قضاء الخالص (28,9%). وان نسبة الوفيات بين المرضى كانت (7,85%) موزعة بنسبة (4,28%) من الذكور ونسبة (3,57%) من الاناث حسب الجنس، بينما نسبة الوفيات حسب العمر كانت (10,8%) في الاعمار دون سن (12 سنة). وتبين من البحث ان أفضل طريقة لتشخيص المرض هي باستعمال اختبار IFAT وبنسبة (69,6%).

**كلمات مفتاحية:** محافظة ديالى، اختبار فحص الاستشعاع المناعي (IFAT)، الحمى السوداء، اللشمانيا الاحشائية، التسمم الجرثومي، التدرن الرئوي.

Introduction

Leishmaniasis is a group of the protozoa zoonosis caused by various species of genus Leishmanial of (500) known Phelbotomies species, (30) of them have been positively identified as a vectors of the disease, the female sand fly transmitted the protozoa, the geographical distribution of disease is limited by depend on the distribution of sand fly and the area who susceptible to cold climate, visceral Leishmaniasis (VL) has been the cause of great suffering and death for hundreds of years. (1).

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Leishmaniasis currently threaten (350) millions of men, women and children in (88) countries around the world. The fatality rate can be as high (100%) if left untreated, over the last 10 years endemic region have spreading further and there has been a sharp increase in number of recorded cases of disease as notification is obligatory in only (33)of (88) countries affected by Leishmaniasis, a substantial number of cases are never recorded as reported in (1).

In fact of two million new cases estimated to occur annually, only (600,000) are officially reported in addition deadly epidemics of visceral Leishmaniasis which also known as Kala-Azar. (2)In Iraq, there are fifteen species of sand fly, but the *Phlebotomous paptassi* is responsible for transmission of the disease to the human as reported in (3).

Transmission of infection depend on the presence of a suitable reservoir and vector with susceptible human population. Large number of cases of V.L are due to *Leishmanial donavani*, which are reported from eastern India and Bangladesh. The children and young adults are the most frequently affected. (4)

In regarding to pathogenesis, including, the promastigotes convert to amastigote in the macrophage, then multiply and eventually disseminate to mononuclear phagocytes through the reticuloendothelial system (6) Increased number of mononuclear phagocytes in the liver and spleen result in progressive hypertrophy, the spleen in particular becomes massively enlarge as splenic lymphoid follicles are replaced parasitized mononuclear cell, in the liver there is marked increase in the number of Kupffers cells, many of which are filled with amastigotes. Infected mononuclear phagocytes also found in bone marrow, lymph nodes. (5).

**Clinical manifestations**

The clinical features of the visceral Leishmaniasis are remarkably similar in different areas of world. The incubation period ranged (3-8) months as reported in (6)The onset of symptoms may be gradual or sudden, subacute or chronic cases, victims experience the insidious on set of abdominal enlargement due to hepatosplenomegaly, fever, weakness, loss of weight, pallor, loss of appetite with sweating and chills. (7)

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Secondary bacterial infection of the skin, respiratory tract and middle ear are common in person with visceral Leishmaniasis (8). Death are frequently due to bacterial pneumonia, septicemia, T.B, or as the consequences of severe anemia or hemorrhage. (9)

### **Aim of the study:**

To demonstrate some epidemiological characteristics and the source with pathogenesis of visceral Leishmaniasis in Diyala province. Also to know the variations about the distribution of the disease between all districts of the Diyala province

### **Patients and methods**

All case sheets of patients with Visceral Leishmaniasis whose admitted to Al- Batool hospital in Baqubah during the period from (January-2015 till January-2016). Data were collected using a simple form, this form contains the following information's (name, age, resident according to health districts, clinical finding as fever, anemia and hepatosplenomegaly). Outcome of the patient (cure, death) . Method of the diagnosis (clinical, I.F.A.T, bone marrow), Method of treatment (Na-stibogluconate) were used in all cases. This information's are obtained separately from the preventive section in Diyala health directorate.

### **Results and Discussion**

Among the (280) patients was found that about 43% of cases less than one year and about 42% aged less than two year. So about 84.4% of aged two years and less. The female to male ratio is about 1.14:1. The majority of male aged 13-24 months (49%) while the majority of female aged  $\leq 12$  months (Table1).

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Table (1): Distribution of the study group according to age and sex.

Age(months)	Sex				Total	
	Male (%)		Female (%)		(No.)	(%)
1-12	47	35.8	73	49	120	42.8
13-24	64	48.8	52	34.9	116	41.5
25-36	11	8.4	16	10.7	27	9.6
37-48	6	4.7	5	3.3	11	3.9
49-60	3	2.3	3	2.1	6	2.1
Total	131	100	149	100	280	100

By using the (Chi -Square test) about the relation between the disease and the sex, the calculated value is (6.759), and this is less than the tableted value (9.488) at the level of significant ( $p=0.05$ ). This is mean the infection is independent on the sex. Concerning month of admission in 2015 found 71.9% patient admitted in the first 4 months (January to April) and about 43% admitted in first two months (Table 2).

Table (2): Distribution of cases according to months of admission.

Months of admission	January-2015 till January -2016	
	(No.)	(%)
January 2015	62	22.1
February	57	20.3
March	50	17.8
April	33	11.7
May	15	5.3
June	10	3.5
July	15	5.3
August	0	0.0
September	10	3.5
October	10	3.5
November	13	4.6
December	5	1.7
Total	280	100

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By using the percentage, the incidence value according to months is (22.1 in January (2015), and the less value in the August month. Regarding the method of diagnosis we found the majority of cases diagnosed by IFAT test (69.6%) followed by clinical diagnosis (24.3%). Diagnosis by bone marrow were done in (6.1%) Table 3.

**Table (3): Distribution of cases according to methods of diagnosis and age.**

Age in Months	Clinical		IFAT		Bone marrow		Total	
	(No.)	(%)	(No)	(%)	(No)	(%)	( No)	(%)
1-12	30	25	82	68.3	8	6.7	120	100
13-24	27	23.3	81	69.8	8	6.9	116	100
25-36	6	22.2	21	77.8	0	0	27	100
37-48	4	36.3	6	54.6	1	9.1	11	100
49-60	1	16.6	5	83.4	0	0	6	100
Total	68	24.3	195	69.6	17	6.1	280	100

**P=0.05**

The calculated value is (0.0115) which is less than the table value (19.00) at the level of ( $p=0.05$ ) and this is supported by the coefficient association value (0.16). Concerning the outcome of disease found that that (22) patients died about (7.85%). This proportion was (4.28%) between the male, and (3.57%) among the female. There is no significant Percentage found between the outcome and sex (Table 4).

**Table (4): Distribution cases according to the outcome and sex.**

Sex	Cure		Death		Total	
	(No)	(%)	(No)	(%)	(No)	(%)
Male	119	42.5	12	4.28	131	46.7
Female	139	49.6	10	3.57	149	53.3
Total	258	92.1	22	7.85	280	100

By using (Chi- Square test) and contingency table ( $2 \times 2$ ), the calculated value is (0.577) and this is less than the tabled value (3.841) at the level of significance ( $P=0.05$ ). This is mean no major effect of the sex on the percentage of the cure or death. Regarding the outcome according the age, found that the more patients in `age of (1-24) months was cured in percentage between

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(89.2%-93%) while the percentage of death is between (7%-10.2%). There is no percent of death among the ages between (25-48) months, but there is less percent of death at the ages (49 – 60) months (16.7%). Table (5).

**Table (5): Distribution of cases according to the outcome and age group.**

Age in Months	Cure		Death		Total	
	(No)	(%)	(No)	(%)	(No)	(%)
1-12	107	89.2	13	10.8	120	100
13-24	108	93	8	7	116	100
25-36	27	100	0	0.0	27	100
37-48	11	100	0	0.0	11	100
49-60	5	83.3	1	16.7	6	100
Total	258	92.2	22	7.8	280	100

By use of the percentage, the death percent is (7.8%), and the high percent is between the age group of (1-12) months (10.8%). Regarding the distribution of cases by health district found the majority of cases from Al-Khalis district (28.9%), followed by those from Baladrose district (25.4%) and Baqubah (23.6%). Table (6).

**Table (6): Distribution of the cases according to health districts.**

Health district	Cases	
	No	%
Baqubah	66	23.6
Al khalis	81	28.9
Baladros	71	25.4
Almoqdadia	47	16.8
Jalawlaa	7	2.5
Khanakin	8	2.8
Total	280	100

By use the percentage, the highest percent of infection (28.9%) in Al-Khalis district and (5.5%) in Jalawlaa district.

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There is a general agreement that the visceral Leishmaniasis is affecting infants and young children. As reported in (10).

Affection of the infants and children could be explain by the fact that young children were probably running a more acute course of the disease, or because common among younger patients, so that parent found it necessary to seek medical advice in a short period and so that diagnosis of visceral Leishmaniasis will be established.

Regarding sex found that the female: male ratio was (1.14:1) this was slightly difference from the finding of (Alwan, 1985) who found this ratio equal to (1.3:1). He seems that such a mild difference could be explain on sample variation.

The peak incidence of visceral Leishmaniasis start to increase in October reaching a peak in January and start to decline in the following months, considering the incubation period of the disease which usually (2-4) months and the delay in the diagnosis detection of the disease until patient admitted can be concluded that the infection started around September, this finding concerning the seasonal incidence.

Regarding the outcome the majority of cases were discharged are improved. The case fatality rate was (7.85%) which is nearly similar to that reported by (Alwan, 1985) which is (7%).

Most of the cases were diagnosed by IFAT (70%) followed by the clinical ground (24%), and the least proportion of the cases were diagnosed by bone marrow.

Alwan, 1985 reported that the majority of cases were diagnosed by IFAT + clinical ground (82%) and the least proportion of cases diagnosed by bone marrow.

By using the coefficient of variant on the result according to methods of diagnosis and age, appear that there is the diagnosis by use the IFAT method; it is a best method because the value of coefficient of variation is (2.309).

By using F test, the calculated value is (0.0115) which is less than the table value (19.00) at the level of ( $p= 0.05$ ), from this result appear that there is no effect of treatment on sex and this is supported by the coefficient of association value (0.16) and this is mean a very weak positive sign.



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### Conclusion

1. More cases of visceral Leishmaniasis appear in Al khalis district among the all districts of Diyala Province.
2. The incidence of infection was more in between the children bellow (1 year) age while the second degree of infection appear in the age bellow (2 years).
3. The more incidence of infection among the females sex.
4. High incidence of out com of patients admit to hospital are cured while the less percent was died.
5. the percentage of the males died are more than in the females.

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