

Epidemiological and Therapeutic Study of Cutaneous Leishmaniasis in the City of Tikrit and It's Suburbs

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Abstract: During this research, the effect of using aqueous and alcoholic extracts of oleander and rhubarb as well as zinc nanoparticles on cutaneous leishmaniasis in Salah al-Din-Tikrit was observed. Where the samples included patients referred to Salah Al-Din Teaching Hospital, The results of the current study, through clinical and laboratory testing of 840 suspected cases during the period between September 2020 to April 2021, showed that the infection rate for males was 58.9%, and the rate for females was 41.1%, meaning that the infection in males was more prominent than females. The age group between (5 months-6 years) showed the highest average of cutaneous leishmaniasis, which amounted to 33.1%, while the lowest percentage was recorded in the age group (51-55), which amounted to 0.7%. The study also showed that the prevalence of infection during the months of the year recorded the highest average of infection during the month of January at 27.5%, and the lowest percentage of infection was during the month of April at 1.3%

1. Introduction

Leishmaniasis is one of the most dangerous parasitic diseases spread widely in countries of the world, especially in tropical and subtropical regions, and the WHO has considered it among the serious diseases AL.Rajhi et al., 2002. The cases number of this disease are estimated to be about twenty million worldwide (WHO, 2020). Iraq is one of the main sources of leishmaniasis, and it constitutes a health problem because of its significant impact on increasing the incidence of patients due to its ability to spread (Al-Jubouri, 2015). Leishmania sp., the causative agent of leishmaniasis, is a protozoan of medical importance and is a unicellular eukaryotic organism. It lives singly and in groups or colonies, and has the ability to perform various biological functions as it lives and reproduces within the macrophage of the vertebrate host. Leishmaniasis has three clinical forms: cutaneous leishmaniasis, mucocutaneous leishmaniasis, and visceral leishmaniasis (Assafa et al, 2006). Cutaneous leishmaniasis (CL) is the most common form (Lantorno et al., 2017). Encouraged the facts that showed that individuals infected with cutaneous leishmaniasis and those whose infections are cured do not contract the disease again, which encouraged researchers to develop a vaccine against this disease (Mohebbali et al., 2019). This parasite spreads in the body of the host according to its type, where the infection is either cutaneous, causing skin abnormalities or ulcers, and then the infection is known as Cutaneous Leishmaniasis, which is caused by the Leishmania parasite. tropica or this parasite may infect the internal organs of the host, causing visceral infections, and then it is known as visceral leishmaniasis caused by L.donovani sam et (al.2009) or the parasite may infect the skin and mucous membranes, causing deformation in the face, as it causes erosion of the membrane separating the two nostrils, which is called camel's nose and the cause of it is L. baraziliensis and it is called American leishmaniasis (Lantorno et al, 2017). Pentostam and anti-meligomine are first-line treatments for leishmaniasis, but they have many side effects (Sundar et al., 2019). In view of their high price and the resistance of parasites to them and their toxicity (Al-Halbosiy et al., 2020), contemplation led to finding other alternative treatments with less toxicity and fewer side

effects, for this reason, plants were used as alternative treatments.

2. Study Aim

- A study of the extent of the spread of leishmaniasis in some areas of Salah al-Din province.
- The use of aqueous and alcoholic extracts of rhubarb and oleander and nano zinc in inhibiting and treating cutaneous leishmaniasis.
- Studying the effect of leishmaniasis infection on some criteria such as (gender, age, type of ulcer, ... etc.).

1) Diagnosis of Leishmania in direct smear and culture media

The current study showed a difference in the incidence of infection in relation to the variation in the methods used in diagnosis (implantation - direct swab). The percentage of negative diagnoses was more than the percentage of Positive diagnoses, and this is consistent with (Al-Rasheed, 2013) and consistent with (Reham, 2018), while 100% infection percentage was recorded through culturing samples in the culture medium RPMI, 1640. The anterior flagella phase of the Leishmania parasite was obtained after 96 hours when testing the samples at a power of 40x, and this differs from (Mousa, 2011), as it indicated death in Leishmania parasite isolates after a short period of development, attributing this to the parasite's weakness or it may be factors related to the culture medium itself, and the study agrees with (Al-Samarrai, 2015). This study, it shows the importance of this medium, RPMI, 1640, in planting samples, unlike the culture medium N.N.N, as (Al-Rasheed, 2013) indicated that it did not obtain positive results when Plant the specimens in the middle of N.N.N.

2) Epidemiology aspect of cutaneous leishmaniasis infection

The results of the current study showed the importance of the epidemiological study of cutaneous leishmaniasis in the city of Tikrit, where the results of our current study showed an increase in cases compared to previous years. The current study recorded the presence of 80 positive cases of cutaneous leishmaniasis out of a total of 840 cases of

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cutaneous leishmaniasis in Salah al-Din province for patients arriving at Salah al-Din Hospital, where the number of positive cases of cutaneous leishmaniasis reached 3.6%. As shown in Table (1-4), (Al-Jubouri, 2015) recorded 232 cases of infection during the last study period While the results of the current study recorded 840 cases of infection during the same period, the reason for the discrepancy in these percentages may be the neglect of the environment, Accumulation of waste near residential areas, in addition to lack of attention to hygiene, which leads to the proliferation of vector insects and their accumulation on waste, which leads to an increase in cases of infection. The epidemiological study showed that the disease is endemic in Iraq in several different provainc, including Kirkuk, Mosul, Salah al-Din, Diyala, Babylon and Maysan, meaning that the spread of the disease is not limited to the southern governorates only, where it has become widespread in different environments, and recently it has spread in most of the country's governorates and areas that did not exist. It has been infected before due to the movement of people and their movement across open borders with a lack of control (WHO, 2008).

3) The prevalence of infection according to the age of the host

The study showed through Table (4-1) that there is a difference in the percentages according to the ages of the injured, the incidence ranged from several months to 55 years. The highest infection rate in the age groups between several months to 5 years in males was 45%, in females it was 32.5%, and in the age group from 6-10 years in males it was 23.4% While the lowest rate of infection was between 55-50 years, which is 0.2%, as it was found that children are the age group most vulnerable to infection and are the main target group for this disease in endemic places (Fenniche et al., 2006). This study agrees with (Al-Jubouri, 2015), where the highest rate of infection was recorded in children, as well as this was reached by the World Health Organization (WHO, 2002). As it clarified that the highest infection rate was in people under 15 years old, but the results of the current study are in agreement with (Reham, 2018), where it showed an increase in the incidence of people in adolescence and youth, as well as these results were contrary to the results of (Al-Abadi, Al-Mousawi, 2016). Where the highest category was recorded among children and they attributed this discrepancy in infection to different age groups of children and this is due to the difference in behavior and movement during sleep for children compared to adults, as well as the weakness of the immune system in children, so the incidence of infection decreases with age as children are more in contact with the external environment (Reyburn et al., 2003) as well as that the elderly in some areas have the belief of self-healing from cutaneous leishmaniasis with the passage of time.

Table 4-1: The location of infection according to the host age

Categories	Number of male infections	%	Number of female infections	%	Total number of infections	%
Months 5-6	225	45.5	105	30.4	330	33.1
10-6	116	23.4	112	32.5	228	27.1
15-11	52	10.5	43	12.5	95	11.3

20-16	25	5.1	30	8.7	55	6.5
25-21	18	3.6	15	4.3	33	3.9
30-26	15	3.0	11	3.2	26	3.1
35-31	19	3.8	8	2.3	27	3.2
40-36	13	2.6	7	2.0	20	2.4
45-41	8	1.6	3	0.9	11	1.3
50-46	3	0.6	6	1.7	9	1.1
55-51	1	0.2	5	1.4	6	0.7
Total	495	100%	345	100%	840	100%
Chi-Square = 31.829 P-Value = 0.0008						

((**indicates that there are high significant differences at level 0.05

4) Prevalence of infection according to the months of the year

Through the study that was currently conducted in (Table 2-4), it was found that there is a discrepancy in the rate of infection during the different months of the year Where the highest infection rate was recorded in January with an average of (27.5%) and the lowest infection rate in April with (1.3%). As the infection is reduced or completely absent in the summer, and this study showed the beginning of the infection during the month of September. months (Monterio et al., 2007) These results are in agreement with (Kadhim, 2012) and (Al-Rasheed, 2013), they recorded the highest rate of infection during January with an average of 56.5%, and it was also in agreement with (Reham, 2018) as well as (Assaad and Ismail, 2015). Where they recorded the highest rate of infection in the month of January (Mokar, 2006). The prevalence of cutaneous leishmaniasis had reached its peak in December and February. This discrepancy in infection rates during the months of the year is due to many reasons, including the variation in environmental conditions in different geographical locations, especially temperatures, as temperature has a significant impact on the processes of infection with the Leishmania parasite (Al-Khazraji, 2005)

Table 4-2: Prevalence according to the months of the year

Months	Male	%	Female	%	Total number	%
September	32	6.7	26	7.1	58	6.9
October	63	13.2	22	6.0	85	10.1
November	82	17.2	26	7.1	108	12.9
December	128	26.9	73	20.1	201	24.0
January	120	25.2	111	30.5	231	27.5
February	32	6.7	98	26.9	130	15.5
March	11	2.3	5	1.4	16	1.9
April	8	1.7	3	0.8	11	1.3
Total	495	100%	348	100%	840	100%
**Chi-Square = 89.508 P-Value = 0.00002						

((**indicates that there are high significant differences at level 0.05

5) The location and number of infection in the host's body

Table 4-3: Site and number of infection in males

infection site	Single ulcers	%	multiple ulcers	%	total	%
face	91	43.1	122	42.5	213	42.8
upper limbs	82	38.9	63	22.0	145	29.1
lower limbs	38	18.0	102	35.5	140	28.1
Total	211	100%	287	100%	498	100%
** Chi-Square = 25.327 P-Value = 0.0007						

The results of the current study in Table (43) showed that the highest infection rate was in people with single ulcers as males in the face area with a percentage of (43.1%). The lowest percentage of infection was in the lower limbs in males, and the highest percentage of infection in males was in the upper limbs with a rate of 29.1%, and the lowest percentage was recorded in the upper limbs in females at an average of (15.2%) and the highest percentage of infection was in the face (52.6%). Also, "the highest rate of infection, both males and females", was recorded in the upper limbs with a percentage of (47%), and this differs with (al-Douri, 2018), where the highest infection rate was recorded in the face, which is due to the presence of multiple ulcers at the site of infection to the occurrence of repeated stings at the same time to the sand fly.

Table 4-4: The site and number of infection in females

infection site	single ulcers	%	multiple ulcers	%	total	%
face	80	65.6	100	45.5	180	52.6
upper limbs	20	16.4	32	14.5	52	15.2
lower limbs	22	18.0	88	40.0	110	32.2
Total	122	100%	220	100%	342	100%
** Chi-Square = 17.432 P-Value = 0.0006						

Table 4-5: The location and number of infection in males and females

%	Multiple ulcers males + females	%	Male + female single ulcers	infection site
17.8	33	35.3	72	face
47.0	87	27.4	56	upper limbs
35.2	65	37.3	76	lower limbs
100%	185	100%	204	Total
** Chi-Square = 21.187 P-Value = 0.0007				

Picture (4-4) of people infected with cutaneous leishmaniasis

6) Prevalence of infection according to the type of ulcer (wet - dry)

The results of the current study in Table (-46) showed that the highest incidence of dry-type ulcers in males and females was (74.8%), while the lowest incidence of wet-type ulcers in males and females was (25.2%). This discrepancy is due to the fact that the parasites belonging to the subtype L. Major are the pathogen of the wet type of infection, while L. tropica is the pathogen of the dry type of infection. It was confirmed (Salih, 2012) that the wet type of infection with the cutaneous leishmaniasis parasite is dominant in Rural areas While the dry pattern is prevalent in urban areas, the results of this study agree with (Reham, 2018), (Moker 2006,) and (Thirsty 2014,.) where the highest incidence of dry ulcers was and the lowest incidence of wet ulcers.

Table 4-6: Prevalence according to the type of ulcer

%	total	%	Female	%	Male	ulcer type
25.2	212	23	89	27.2	123	wet
74.8	628	77	298	72.8	330	dry
100%	840	100%	387	100%	453	Total
Ns Chi-Square = 0.123 P-Value = 0.726						

7) Repeat infection in the same host

The results of this study showed that the infection percentage is within families with multiple injuries, while the lowest percentage of infection was recorded among families with single infection. The reason for the high incidence of disease from infected multi-individual families is due to the presence of the vector in the same place, which leads to infecting family members by stinging family members in the same house. The sand fly feeds on blood meals every 3-4 days during its lifespan (Abu Al-Hab 1978,) The reason for the increased incidence of infection in many members of the same family may be due to the fact that they are exposed to the same environmental risks, such as the presence of animals that represent the parasite’s reservoir hosts, as well as the presence of the insect in the same house, which causes multiple infections inside the house as a result of repeated stinging. This study agrees with (Al-Rasheed 2013 .) and it differs with (Kadhim et al., 2014).

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