A Survey of the Sand Fly Species and Comparing them with the Rates of *Cutaneous Leishmaniasis* (Baghdad Boil) in Different Habitats of Kut City- Wasit Province

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Abstract

The study was carried out in different habitats of Kut city (the center of Wasit governorate) during the period from 1 January to the end of December 2020. It was included a survey of sand fly species that carry the parasites that cause cutaneous leishmaniasis. The results were showed to three types of sand flies (*Phlebotomus papatasi, Sergentomiya sintoni and Phlebotomus sergenti*), (67.1, 21.4 and 11.3%), respectively. The study showed to find 214 cases of cutaneous leishmaniasis, as the Al-Kut District Center recorded the highest rate of infection, reached 30% (65 cases). While regions of Al-Battar village, Al-Karimiyyah and Al-Jamaa neighborhood recorded 9% (2 cases) for each, which is the lowest rate. The infection rate in November reached 24.7% (53 cases), which is the highest rate, while July was 1.40 % (3 cases), which is the lowest rate of infection. The study was indicated that males are more susceptible to sand fly bites, with rate 55.6%, while the rate of targeting of females is 44.3%. The study showed that the rate of sand fly infestation for children age of (1-5) years was 25.2%, which is the highest, while its injury rate in age (61-65) years reached 0.46%, which is the lowest rate.

Key world: *sand fly species, Baghdad boil, Cutaneous leishmaniasis*

Introduction

The six-legged Insecta (Hexapoda) is the largest class in the animal kingdom in the animal species due to its ability to rapidly adapt to various environmental variables, therefore they became importanent in medical and agricultural space [1]. In the medical field, insects are considered an effective element in transmitting pathogens, whether parasitic or bacterial, as in the sand fly insect (Diptera). Sand fly transmits various pathogens .Leishmaniasis diseases is one of the most important diseases transmitted by the sand fly [2,3,4]. WHO (1990) Indicated the presence of more than 700 species of *Phlebotomus*[5], while [6]confirmed that 30 species of them are a confirmed vector for Leishmaniasis parasites. Iraq is one of the endemic countries for Cutaneous Leishmaniasis. The World Health Organization 1996 was indicated that *Lei shmania tropica* is one of the endemic diseases in many countries of the world [7]. Iraq one of them. *Leishmania tropica* is transmitted by the bite of the sand fly insect, (Figure, 1) as this type of leishmaniasis is effective in urban habitats. [8] recorded 178 cases of Cutaneous Leishmaniasis in parts of Wasit governorate, The highest infection was in the city of Suwaira 90 cases, while was lowest infection in Badra city (one case),The infection rates ranged in Al-Aziziyah, Al-Nu`maniyah, Al-Hayy , and AL- Kut were (51%, 18%, 21% and 6%) respectively. [9] indicated that *Phlebotomus papatasi* is a vector for parasites with cause Cutaneous Leishmaniasis in Iraq.

Figure(1) : Cutaneous Leishmaniasis:

Materials and Methods

Rate of injure

Field visits were conducted weekly to investigate the patients with *cutaneous leishmaniasis* (Baghdad boil) who visited the Al-Karamah Teaching Hospital in the Kut city during the study period. The injury was diagnosed through a clinical examination by the specialist doctors. The clinical information of each patient was recorded in a special form that included gender (Sex), age, habitat of residence, and the presence or absence of animals and rodents in the home.

Sand fly species survey

The study was included the Kut city which has the injuries in the city center of AL-Kut, Al-Hakim zone, Al-Battar village, Umm Hillel, Al-Karadiyah, Al-Nfat Street, Al-Hawra zone, Al-Falahiyah, Al-Mazak, Al-Wafidin, Al-Siyasiyoun zone, Al-Karimiyyah, Al-Yusufia, Al-Badriya, Sarroukia, Al-Azza Al-Jadidah , The Al-Azza, Al- qadema ,Anwar al-Sadr and the Jihad zone). 2100 insects were collected by aspirator .They were identified according to the classification key for [10].

Results and Discussion

Geographical distribution of injuries.

The study was showed 214 confirmed cases of cutaneous leishmaniasis were recorded during the study period, The injuries were distributed as follows: Al-Kut City, Al-Hakim zone t, Al-Battar Village, Umm Hillel, Al-Karadiya, Al-Naft Street, Al-Hawra zone, Al-Falahiyah, Al-Wafidin, Al-Siyasiyin zone, Al-Karimiyyah, Al-Yusufiya, Al-Badriyah, Al-Azza, Anwar Al-Sadr, Al-Jihad zone and Al-Jamaa zone (65 , 21, 2, 7, 10, 28, 10, 10, 6, 4, 2, 3, 4, 3, 22, 15 and 2), respectively (Figure 2) . The Kut city recorded the highest injuries it reached 30% (65 cases) because it is densely populated areas, in addition to the more of garbage dumps, while the rate of infection in the village of Al-Battar, Al-Karimiyyah and Al-Jamaa zone was 0.9% (2 cases) for each, which is the lowest rate with leishmaniasis, In this context [8] explained the presence of Baghdad boil infections in the Kut city due to the neglect of the environment, the accumulation of waste near residential areas, the Lack of attention to hygiene is one of the important factors that contribute to the reproduction of the insect and its accumulation on waste, and then an increase in the number of cases [11].

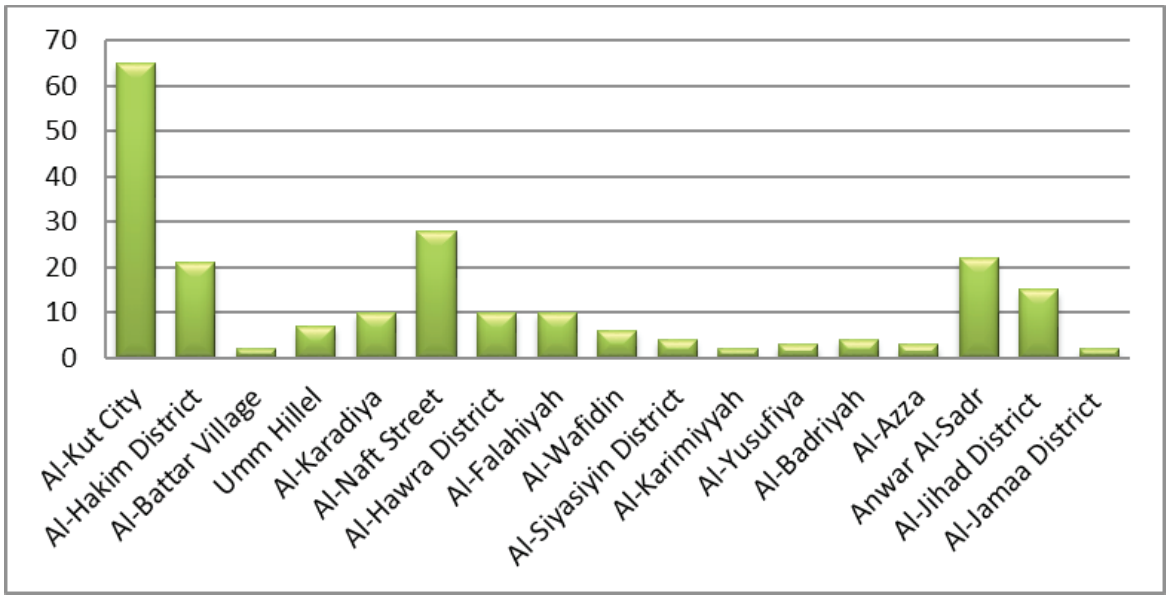

Figure (2): Number infections of Baghdad boil according to the regions

Sand fly injury rates by gender

The statistics which showed by the study indicated that males were recorded a higher rate of injury 55.6% (119 cases), while females were less to be infection reached 44.3% (95 cases), (Figure, 3). This may be due to the fact that males are more vulnerable of the females being stung by sand flies because they sleep naked and do not wear protective clothing or sleep with underwear clothing only, this is unthinkable for females, this is fully applicable to what was mentioned by[12] in the governorate of Baghdad.

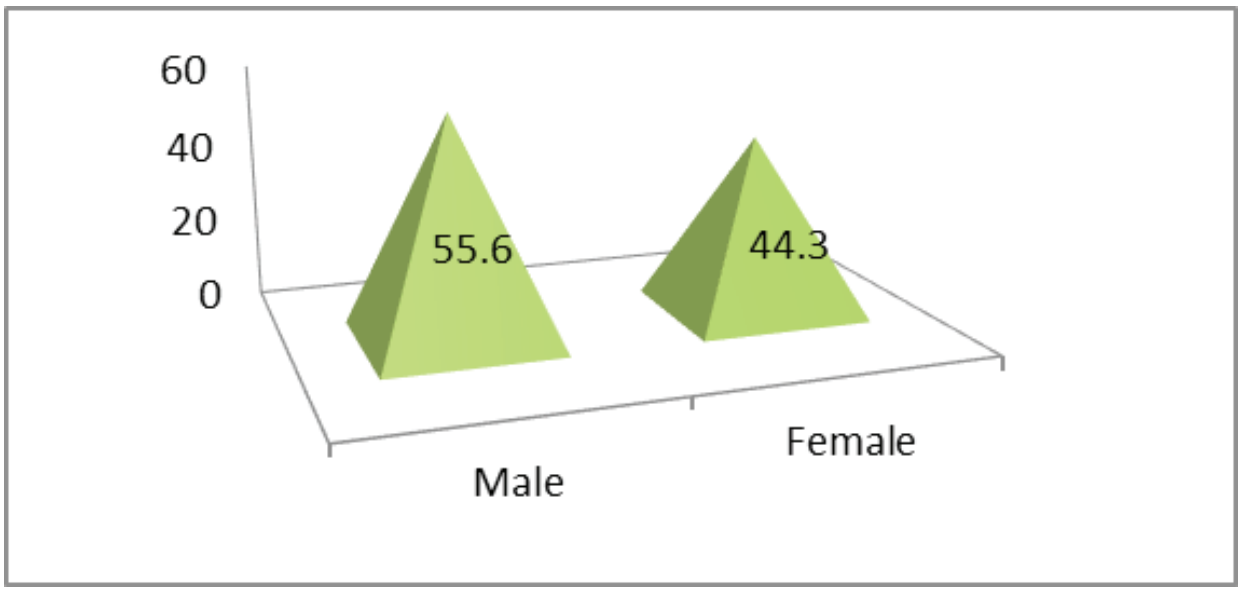

Figure 3: Sand fly infection rates by gender

Sand fly injuries according to age

The study was showed that children age (1-5) years were the most affected by sting of sand fly, their injury rate was 52.2% (54 cases). While, the ages between (61-75) years were the lowest, with a rate of 0.46% (1 case). (Table, 1) This is due to the inability of children to protect themselves against stings, especially when they sleep naked, on the one hand, and on the other hand, this variation in injuries may be due to the failure of their immune defenses to fully develop [13].

Sand fly infestation according to age Table (1):

No	Age/Year	Numbers of Infested	Percentage of Injury
1	1-5	54	25.2
2	6-10	50	23.3
3	11-15	25	11.6
4	16-20	24	11.2
5	21-25	15	7.00
6	26-30	13	6.07
7	31-35	8	3.73
8	36-40	6	2.80
9	41-45	7	3.27
10	46-50	5	2.33
11	51-55	3	1.40
12	56-60	2	0.93
13	61-65	1	0.46
14	66-75	1	0.46

Rate of infection according to the months of the year

The study showed that the highest incidence of Baghdad boil disease is carried by the sand fly was in November 2020, at a rate of 24.7% (53 cases). Subsequently it started to descend gradually until July, which recorded the lowest rate of injury, reaching 1.40% (3 cases), and then the injuries began to increase. Gradually (Figure, 4) and perhaps the reason for showing the infections and their increase is due to the temperature, where the insect attack begins near the end of the summer season in conjunction with the activity of the vector insect, its density and the incubation period of the parasite according to the type, temperature, food, and host response at the peak of the sand fly spread in Iraq, It is September, which corresponds to the life cycle of the parasite of 4-6 months, and consequently, the appearance of infections at the end of November and the beginning of December [14].

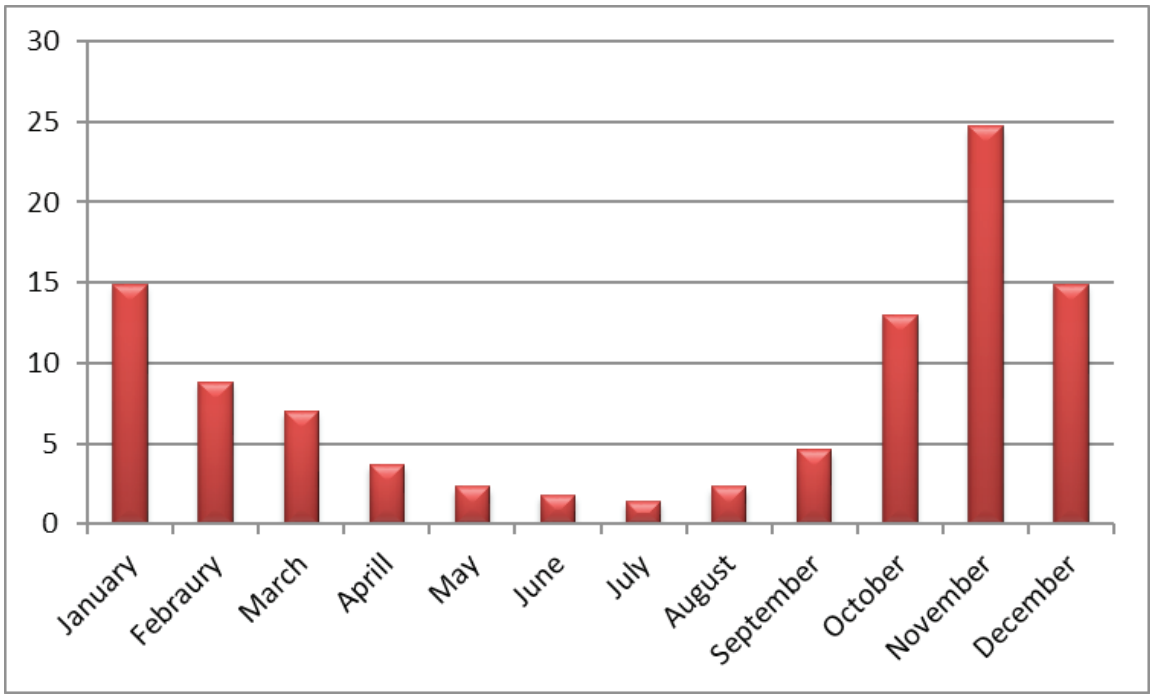

Figure (4): Rate of infection according to the months of the year

Survey of sand fly species in habitats where Baghdad boil disease appeared

The study showed to presence three types of sand fly in the studied habitats, namely *Sergentomiya sintoni*, *Phlebotomus papatasi* and *Phlebotomus sergenti,* and their presence was in different proportions (Table 2). *P. papatasi* was recorded highest rate of infection it reached 67.1% while the type *S.sintoni* recorded percentages of 21.4%. Phlebotomus sergenti was the least prevalent among the insects that were found at a rate of 11.3% (Table 2). The study was showed to the infection rate increased specifically in the city center, the type *Phlebotomus papatasi* was the predominant type because it preferred human housing, while the type *Sergentomiya sintoni* was the presence of the least in the same area despite it being highly preferred by human dwellings [15].

Table 2. Prevalence of species of sandy fly that were collected from different places

NO	Sandy fly	NO: of Sandy fly	% Presence
1	Sergentomiya sintoni	451	21.4
2	Phlebotomus sergenti	239	11.3
3	Phlebotomus papatasi	1410	67.1

Conclusions

From The present study the following conclusions are observed:

1- The highest recorded cases of the disease Leishmaniasis was in the city center areas.

2- Males have a higher rate of this disease than

females.

3- Children were the most susceptible to this disease.

4- The highest injury was recorded in November, while the lowest was recorded in July.

5- Phlebotomus papatasi is the abundant species, especially in the areas that recorded the highest injury.

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Ethical Clearance: Not required

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