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Cutaneous Leishmanasis and Health Awareness to Prevent its Spread in Nineveh Governorate, Iraq

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Abstract

Cutaneous leishmaniasis is caused by an unicellular flagellated parasite belonging to the genus *Leishmania*. The infection occurs when a sand fly bites the skin of the vertebral host, leaving a deep sore with deformation of the skin area.Data were collected in the current study based on various criteria, including gender, seasonal diversity, age groups and house environment.Males recorded a higher mean infection than females reaching 72.2 compared to 64.0 for females. The highest mean infection was in Winter, reaching 79.0 compared to the lowest mean infection recorded in the Autumn, which was 10.0. The age groups between 4-12 years recorded the highest mean infection reach to 29.0 compared to the other age groups. The housing environment also hada clear effect on the mean infection reaching 100.0, in the village, which is higher than in the city asit reached 36.20. Cutaneous leishmaniasiscases number differ according to many factors like sexes, seasonal diversity, age groups and housing environment.Given the seriousness of this disease, health measures must be taken to avoid exposure to sand flies that transmit the disease.

Keywords:*Leishmania*, Cutaneous leishmaniasis, Parasitic diseases , Epidemiology, Medical Parasitology, Nineveh, Iraq.

Introduction

To this day, leishmainasis remains a threatto human and a global disease caused by intracellular parasites of the genus *Leishmania*. Depending on the clinical features, leishmaniasis can be classified into three clinical forms, cutaneous leishmaniasis (CL), which is the most common form caused by *L. tropica*, accounting for 50-75% of all other infection WHO,[1] , mucocutaneousleish-maniasis and visceral leishmaniasis, which are the most virulent ones, caused by *L.brazilience*and*L. donovani* respectively Desjeux,[2], Murray *et al.* [3] .

According to the form, these species are similar in appearance, but are in conflict with each other in a few distinct characteristics, physiological aspects, geographical distribution and vector types David and Craft[4], Hailu *et al*.[5] , also the type and severity of the symptoms of leishmaniasis varies, depending on theparasite's species, genotype, nutritional status, a person's ability to resist the

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disease, vectors and environmental factors Hailu *etal*.[5] , Lipoldova and Demant,[6] .

These parasites infect humans andmammalian such as rodents and canines, which are representthe main reservoirs. Such dogs are the species that contribute most to the epidemic of this disease and are transmitted to vertebrates through the bite of the sand fly that belongs to *Phlebotomus*genus, WHO,[7], Dawit, *et al*.[8], where the parasites are found as an intracellular motile (amastigote) stage within the phagocytes of the vertebrate host, while it develops as an extracellular motile stage (promastigote) in an invertebrate host Dates,[9] .

This disease is a global health problem, affecting nearly 12 countries and constituting a major health problem in the eastern Mediterranean region. By geographical distribution, the disease is divided into leishmaniasis in the Modern World and lesimaniasis in the Ancient World Dujardin *et al*.[10], Pastigo,[11] . Cutaneous leishmaniasis considered one of the endemic diseases in Iraq and some neighboring countries and it is known as eastern ulcer, and locally called the Baghdad boil.Most of the leishmaniasis cases recorded by the World Health Organization indicate that it was caused by tropical leishmaniasis, which causes a wet ulcer in Iraq, especially in semi-urban and rural areas (Momeni et al.[12] , Al-Warid *et al*.[13] .

Al-Jeboori and Evans [14] were recorded a number of cases of infection with this parasite in Iraq due to *Leishmaniatropica*, while Ali, *et al*.[15], documented a greater number of infections described by *L*. that cutaneous leishmaniasis caused on the epidermal layer of the skin through injuries that extend from pimples or burning nodules in the affected area to deep tissues to ulcerated skin in exposed areas of the body such as the legs, feet and hands and it may turn into hyperkeratotic skin. In a few cases, about 200 ulcers can occur in the affected person and the ulcer recovers at that stage after different periods according to the species of *Leishmania*after treatment of the skin injury leaving a scar pitted inside skin with permanent deformation within the affected area David and Craft[5] , Ali, *et al*.[15], Reguera *et al*.[16], Bukar *et al*.[17] .

Despites the severity of these diseases, they did not receive much attention, especially in poor regions of the world, although there are approximately 350 million individuals exposed to the risks of this disease (Sharqui and Al-Kafaji,[18] .

Cutaneous leishmaniasiswasreceived great interest and there have been many attempts to treat it, including the use of heat, red ray and others in its' treatment,as well as the utilize of chemotherapy which includes medicationsofPentostam or Glucantime which is one of the oldest treatments withsuccess in treating numerous types of Leishmaniasis Asilin and Modabber[19] .

The effect of the drugs may be restricted due to the variations in sensitivity of the diverse species of *Leishmania* to drugs and its' side effects, as well as the diverse effectiveness of a persons' immune system against the disease, Hassan and Najim,[20] .

In conclusions, it is necessary to take into account the saying that prevention is better than cure, so a person must avoid infection by eliminating sand flies that transmit disease, avoid exposure to its stings, not staying in open areas, and spraying

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pesticides in house, as well as spreading health awareness and culture and adopting strategies for avoiding and limit the spread of this disease Davies et al.[21] .

The aim of this study is to estimate the cases number of cutaneous leishmaniasis in Ninenevh governorate and the variation in the cases number based on criteriaincluding, gender, age groups, seasonal variation and housing environment.

Material and Methods

Study area

Topography, Nineveh governorate is located northwest of Iraq. It has borders with Syria and the Iraqi provinces. Nineveh province is the third largest province in Iraq in terms of size, after Baghdad and Basra.Its total area is estimated at 37,323 km 2. The capital of the governorate is the city of Mosul. The Tigris River extends from the northwest to the south of the governorate. The governorate includes eight regions, as shown in Fig.(1).The population of Nineveh Governorate was about 3,273,000 in 2009 Nineveh,[22]. Nineveh governorate has fabulous climatic conditions, because it is interesting among the governorate of Iraq. With a length of Spring and Autumn, for this reason it was called Um-Al-Rabiain.

Fig.(1): Map of Nineveh governorate

Data collection

Data were collected on cutaneous leishmaniasis for the period from September 2008 to September 2012 in coordination with the Nineveh Health Department, a dermatologists at the Communicable Diseases Center, and a consultant dermatologists. Diagnosis of CL has been made on the basis of clinical features and in doubtful cases, smears are taken from the area of infection and fixed with alcohol, then stained with 10% Giemsa stain and diagnosed under light microscopy. Data are organized according to several criteria, including, sexes, age groups, seasonal variationand house environment in Nieneveh governorate.

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Statistical analysis

Comparison between groups were made using ANOVA and (Duncan test) Al-Zubaidy and Al-Falahy,[23] .

Results

Table 1: Shows the differences in number and percentage of CL cases between males and females for the period 2008-2012 in Nineveh governorate.

years	Sexes		Total number of infections
	Male(No. &%)	Female(No.& %)	
2008	28(62.2%)	17(37.7%)	45
2009	14(41.2%)	20(58.8%)	34
2010	53(54.6%)	44(45.4%)	97
2011	95(51%)	91(49%)	186
2012	170(53.2%))	149(46.8%)	319

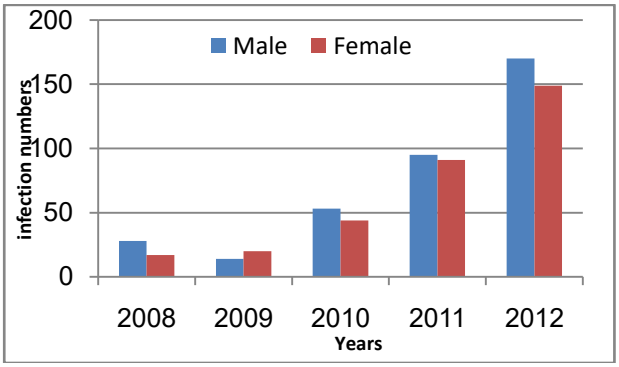

Fig. 2.:Shows the infections of CL distributed according to the sex for the period 2008-2012 in Nineveh governorate

Table 2: shows mean infections of CL by years and sex for the period 2008-2012 in Nineveh Governorate.

Mean infections	Sexes	Mean infections	Years
A72.000	Male	D22.500	2008
A64.000	Female	D17.000	2009
		C48.000	2010
		B93.500	2011
		A159. 500	2012

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Fig 2: Shows the infections of CL distributed according to the sex for the period 2008-2012 in Nineveh governorate.

Tables (1and 2) show that there were no statistically significant differences between the meansexes, while there were statistically significant differences in the mean years at the level of 1%. It was also noted that the highest mean infections was in 2012, with a significant difference from other years, as 2009 recorded the lowest mean infections for both sexes, where males scored the highest mean incidence 72.0, while it was 64 for females (Fig.2).

Table 3: Shows the differences in number and percentage of CL cases distributed between the seasons for the period 2008-2012 in Nineveh governorate.

Years	Seasons				Total number of infections
	Winter	Spring	Summer	Autumn	
2008	19 (42.2%)	15 (33.3%)	5 (11.2%)	6 (13.3%)	45
2009	30 (88.2%)	0 (0%)	0 (0%)	4 (11.8)	34
2010	39 (40.2%)	44 (45.6%)	7 (7.1%)	7 (7.1%)	97
2011	151 (81.2%)	21 (11.2%)	2 (1.1%)	5 (2.5%)	186
2012	156 (48.9%)	133 (41.8%)	2 (0.6%)	28 (8.7%)	319

Table 4: Shows mean infections of CL by years and seasons for the period 2008-2012 in Nineveh Governorate.

Mean infections	Seasons	Mean infections	Years
A79.00	Winter	B11.25	2008
AB42.60	Spring	B8.50	2009
B4.60	Summer	AB24.50	2010
B10.00	Autumn	AB46.50	2011
		A79.75	2012

It is noted through the tables (3and4) that the mean infections for years and seasons was significant at level 1%.It is also evident through the mean infections with cutaneous leishmaniasis, that the highest mean infections was 79.75 for the year 2012 with a significant differences from what it was for the year 2008 and 2009, and not significant for the years 2010 and 2011, while the lowest mean infections was 8.5 for the year 2009. In comparison in the seasons, the tables indicate that the highest mean infections was 79 in Winter, with a significant difference from that in Summer and Autumn, as the Autumn recorded the lowest mean infections reaching 10.0 (Fig. 3).

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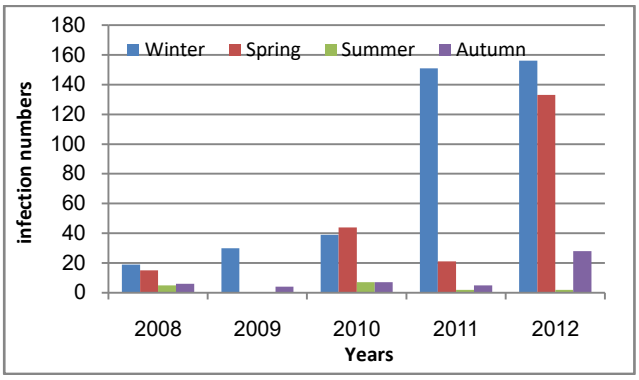

Fig 3: Shows the infections of CL distributed according to the sex for the period 2008-2012 in Nineveh governorate.

Table 5: Shows the differences in number and percentage of CL cases distributed according to the age groups for the period 2008-2012 in Nineveh governorate.

year	Age Grope (No.&%)								Total
	Infancy 1-12month	Toddler 1-3years	Prescho ol age3-6years	School age6-12years	Adoles cent 12-18year	Young Adult1 8-35year	Middle adult35 -65year	Oldadul t 65-over	No. of infectio n
2008	0 (0%)	6 (13.4%)	9 (20%)	17 (37.8%)	3 (6.6%)	6 (13.45)	4 (8.8%)	0 (0%)	45
2009	5 (14.7%)	2 (5.8%)	5 (14.7%)	6 (17.7%)	3 (8.8%)	6 (17.7%)	7 (20.8%)	0 (0%)	34
2010	2 (2%)	6 (16.5%)	12 (12.4%)	21 (21.7%)	8 (8.3%)	27 (27.8%)	11 (11.3%)	0 (0%)	97
2011	8 (4.3%)	16 (8.7%)	37 (19.9%)	38 (20.4%)	23 (12.4%)	39 (20.9%)	25 (13.4%)	0 (0%)	186
2012	11 (3.4%)	33 (10.3%)	53 (16.6%)	64 (20%)	4213.1%)	64 (20%)	52 (16.3%0	1 (0.3%)	319

Table 6: Shows mean infections of CL by years and age groups for the period 2008-2012 in Nineveh Governorate.

Mean infections	Age grouping	Mean infections	Years
DE5.200	From 1-12 months	C 5.500	2008
CDE10.200	From 1-3 years	C 4.250	2009
AB23.400	From 3-6 years	C 21.625	2010
A29000	From 6-12 years	A 39.625	2011
BCD15.000	From 12-18 years		2012

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AB28.000	From 18-35 years		
ABC19.800	From 35-65 years		
E0.200	More than 65 years		

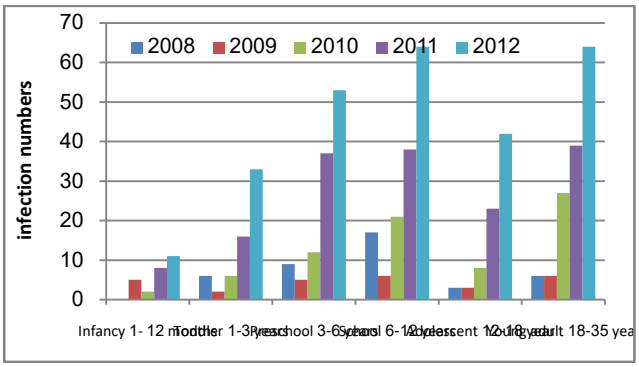

Fig 4: Shows the infections of CL distributed according to years and age groups for the period 2008-2012 in Nineveh governorate.

The two tables (5and6) show a significant differences in the mean years and mean age groups at 1% level. It is evident from the mean infection across years and age groups that the mean infection was 39.42 in 2012. In comparison between age groups, there was a variation in the mean infections, with the 6-14 yearsagegroupregistering the highest infections of 29.0, while the lowest infection was in persons over the age of 65 years (Fig.4).

Table 7: Shows the differences in number and percentage of CL cases distributed according to the years and house environment for the period 2008-2012 in Nineveh governorate.

	House environment		
Years	City (No.&%)	Village(No.&%)	Total number of infections
2008	5(11.1%)	40(88.9%)	45
2009	7(20.6%)	27(79.4%)	34
2010	31 (32%)	66(68%)	97
2011	45(24.2%)	141(75.8%)	186
2012	93(29.2%)	226(70.8%)	319

Table 8: Shows Mean infections of CL by years and house environment for the period 2008-2012 in Nineveh Governorate.

Mean infection	Housing	Mean infection	Years

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B36.20	City	B22.50	2008
A100.00	Village	B17.00	2009
		B48.50	2010
		AB93.00	2011
		A135.50	2012

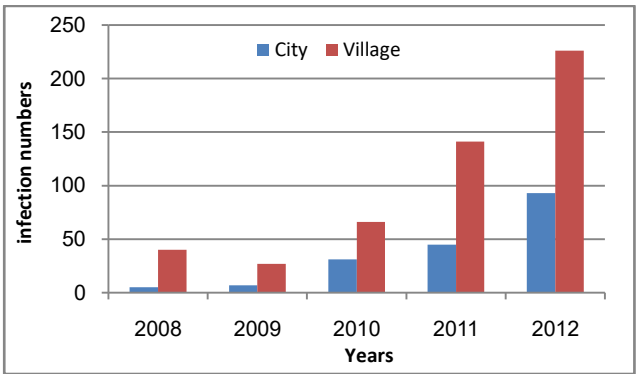

Fig 5: Shows the infections of CL distributed according to yearsand house environment for the period 2008-2012 in Ninenevh governorate.

It appears from the tables(7and8) that the mean infection for both years and housing was significant at level 1%, where the highest infections observed in 2012, with a significant difference from that of 2008 and 2009. By comparison between housing sites, it indicates that the higher in the village, which it reach 100.0 with a significant difference from the city, which reach 36.20 (Fig. 5).

Discussion

In our view, the higher incidence of cutaneous leishmaniasis in males than females may be attributed to the active movement of males, going outdoor to work for long hours, and wearing special clothing that may expose parts of the body to sand fly bites.

Compared to females, most of them are working inside the house and they wear clothes that cover all parts of the body except for the face when leaving the house in view of the traditions and social norms, especially in rural areas, with no interest to reviewing health units.

Males may also be interested in treatment and reviewing health clinics, which may increase the number of cases registered as a result of the prevailing awareness in rural areas compared to women. The result of the present study agreed with many studies Rahi,[24], Klein and Roberts,[25], Al- Obaidi *et al*.[26], Galgamuwa *et al*.[27] . this may be due to the effect of sex hormones on the immune response where experimental researches indicate it effect of these hormones on skin structure and physiological aspects between males and females, Dao and Kazin,[28] , Rubinow,[29] , as well as the variation in the number of immune cells in females compared to males as, neutrophils, monocytes in spleen as well as macrophages, B

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cells $CD4^+$. Where it was found, through experimental researches on hamsters, that the estrogen hormone has a role in providing resistance to female hamsters against infection with *Leishmania spp*. Travi *et al*.[30], Scotland *et al*.[31], Al-Khayat,*et al*.[32].

In terms of differences in the seasonal spread of cutaneous leishmaniasis, this may be related to the activity of sand flies related to the climatic conditions in terms of temperature, humidity and the development of the female insect that needs blood during the life cycle to mature and complete the life cycle, especially in the Spring, Summer and hot months simultaneously with the activity and intensity of the vector insect, and after an incubation period that depends on the species of parasite and the response of the host and symptoms begin to appear in the Winter, Seaad *et al*.[33], it appears that seasonal variation and climatic factors play a role in the infection, as Winter records higher incidence of CL than in Summer, Al-Obaidi, *et al*.[26] , Hlavacova *et al*.[34] . The results that we reached through this study indicate a higher incidence rate in Winter compared to other seasons, and these results are consistent with other studies, Amin *et al*.[35], Tiwary *et al*.[36] .

The results of the current study showed that people between 6-14 years old were more likely to develop cutaneous leishmaniasis due to the great activity of this age groups in terms of going outdoor to play or go to schools and being exposed to sand flies, and compared with the large age groups over 60 years, where this age group may not pay attention to visiting health units when the disease appears or because of the chronic diseases that cause their stay at home and their limited movement. All these factors have led to a variation in the incidence of cutaneous leishmaniasis with different age groups and these are consistent With many studies, Galgamuwa *et al*.[27], Al-Tawfiq and Abukhamsin,[37], Moosazadeh *et al*.[38] .

Our results from the current study on housing environment are consistent with many studies, Rahi,[24], Al- Samarai and Saher,[39] , as these studies indicate the prevalence of cutaneous leishmaniasis in rural areas in southern Iraq and the Republic of Iran. The high rate of infection in rural areas more than the city may explain the large number of stray animals such as dogs and rodents, which contributes to perpetuation of the life cycle.

The insect also spends part of life in damp and dark places in the bedrooms, especially in the corners near the ceilings, the pits of rodents and barns that bounds in rural areas and far from air currents or light, where the insect flies in to obtain a blood meal from a human or animal that necessary for growth, Sharifi *et al*.[40], Kumar and Samant,[41] .

Through our findings, and to limit the spread of the disease, health awareness must be increased, especially in rural areas, and insecticides should be sprayed to eliminate the sand flies that transmit the disease.

Also, not sleeping in the open, using mosquito nets, and wearing protective clothing to protect body parts from the bites of insects that transmit the disease, put protective nets on doors and windows and review heath units when exposed to infection to limit spread of the disease, Rahi,[24], Kumar and Samant,[41], Duszak et al.[42], Sakhaei *et al*.[43] and [44-49].

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Conclusions

The current study showed a clear variation in the number of cutaneous leishmaniasis cases according to several criteria including gender, seasonal variation, age groups and housing environment. The Winter, the males, the age groupsof 4-12 years and village residents recorded higher rates of infection with this disease compared to the other.

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REFERENCES

1. World Health Organization. Gulf syndrome "Bug" is found parasite in *Leishmaniatropica*. Report of whoexport committee. Tech.Rep.SeriesWHO,2002;No. Geneva:pp1-3.
2. Desjeux P. Leishmaniasis: current situation and new.Comp. Immurol.Microbiol. *Infect. Dis.*,2004; **27,** 305-318.
3. Murray HW,DermanJD,DaviesCR and Saravia NG. Advance in leishmaniasis. *Lancet*,2005; 366:1561-1577.
4. David CV , Craft N. Cutaneous and mucocutaneousleishmainasis. *Dermatologic Therapy*,2009; **22:** 491-502.
5. Hailu AD ,Boelaert M. Leishmaniasis, in Neglected Tropical Diseases-sub-Saharan Africa. Springer, 2016; : 87-112.
6. Lipoldova, M. ,Demant, P. Genetic susceptibility to infectious disease: lessons from mouse models of leishmaniasis. *Nat. Rev. Genet*,2006; **7(4):**294-305.
7. World Health Organization Control of the leishmainasis. Report of a WHO ExpertCommittee.World Health Organ Tech Rep Ser; 1990; 793:1-158.
8. Dawit G, Girma Z, Simenew K. A Review on Biology, Epidemiology and Public Heath Significance of Leishmaniasis. *J. Bacteriol and Parasitol*.,2013; **4(2)** :1-7.
9. Dates PA. Transmission of *Leishmania* metacyclicpromastogots by Phlebotomine sand flies.*Int.J.Parasitol*., 2007; **37(10):**1097-1106.
10. Dujardin JC,Cannavate C, Dedet JP, Grandoni L,Soteriadou K, Ozbel Y, Boelaert M. Spread of vector-borne diseases and neglect of leishmaniasis. Europ.Emerg. *Infect.Dis*.,2008; **14(7):**1013-1018.
11. Pastigo JA. Leishmaniasis in the world Health Organization Eastern Mediterranean Region. Int.J. Antimicrob. *Agents*,2010; **36(1):** 62-65.
12. Momeni A.Z, Yotsumolo S, Mchergam D, Mchnegan AH, Mchergan, DA, Aminijavaheri M, Fujiwarw H. Chronic lupoidleishmaniasis evaluation by polymerase chain reaction. *ARCH. Dermatol. Fab,* 1996; 1(132):189-202.
13. Al-Warid HS, Al-Saqur I, Al-TuwaiJari S, Al Zadwai K. The distribution of cutaneous leishmaniasis and climate aspects. *Asian Biomedicine,* 2017; **11(3):**255-260.
14. Aljeboori II, Evans D. Leishmaniasisspp.In Iraq. Electrophoretic isoenzyme patterns. II. Cutaneous leishmaniasis. *Transactions of the Royal Society of Tropical Medicine and Hygiene,*1980; **74(2):** 178-184.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 4, 2021, Pages. 10937 - 10948
Received 05 March 2021; Accepted 01 April 2021.

15. Ali MA, Rahi AA, Khamesipour A. Species Typing with PCR-RELP from cutaneous leishmaniasis patients in Iraq. *Donnish Journal of Medicine and Medical Sciences*, 2015; **2(3):** 026-031.
16. Reguera RM, Cubria JC, Ordozen D. Review the pharmacology of leishmaniasis. *J.Pharmacy*.1998; **30(4):**435-443.
17. Bukar A, Denue B, Gadzama G , Ngadda H. Cutaneous leishmaniasis: Literature review and report of two cases from communities devastated by insurgency in North- East Nigeria. *Global Journal of Medicine and Public Health,2*015;1-9.
18. Sharqui KE, Al-kafaji KA. Incidence of skin disorders in Iraqi infants and children, J. of Babylon university saris D. *Medical Sciences*,1997; **2(4):**511-523.
19. Asilin AA and Modabber, F. Leishmaniasis. Postgrad. Doc.Med.Eas.,1998; **21(15):**174-181.
20. Hassan, H. F. and Najim, Z. K. Antileishmanial effect of *Berberis*andextracts of *Berberisvulgaris*on the growth of *leishmania* species. *International J. of Pharmaceutical Quality Assurance*,2020; **11(2):** 1-5.
21. Davies C, Llanos-Cuentas E, Campos Monge J, Leon E. Spraying houses in the Peruvian Andes with lambda-cyhalothrin protects residents against cutaneous leishmaniasis. *Trans. R. Soc. Trop. Med. Hyg.*, 2000; **94**:518-527.
22. "Nineveh - NCCI Governorate Profile" (PDF)*.2010. p. 4*.Retrieved 21 December 2019.
23. Al-Zubaidy, Kh, Al-Falahy M. Principles and procedures of statistics and experimental designs. *Duhok University publication*,2016; P:396.
24. Rahi AS. Cutaneousleishmaniasis at Waist governorate. *Baghdad Scio.*,2011; **8(2):** 286-288.
25. Klein SL, Roberts CW. Sex and gender Differences in infection and treatments for infectious diseases: Springer *International Publishing*,2015;DOI 10.1007/978-16438-0.
26. Al-Obaidi MJ, Abd Al-Hussein MY, Ihsan M. Survay study on the Prevalence of Cutaneous Leishmaniasis in Iraq.*Iraqi Journal of Science*.,2016; **57(3):** 2181-2187.
27. Galgamuwa LS, Sumanasena B,Yatawra L, Wickramasingle S, Iddawda D. Clinco-epidemiological paterns of cutaneous leishmaniasis patientsattending the Anuradhapura teachinghospital, Sri Lanka. *Korean J Parasitol*.,2017; **55(1):**1-7.
28. Dao HJ, Kazin RA. Gender differences in skin: a review of the literature. Gender Medicine,2007; **4(4):**308–328.
29. Rubinow KB. An intracranial view of sex steroids, immunity, and metabolic regulation. *Molecular Etabolism*, 2018; **15**:92–103.
30. Travi BL, Osorio Y, Melby P, Chandrasekar P, Arteaga L, Saravia N. Gender is a Major Determinant of Clinical Evolution and Immune Response in Hamsters Infected with *Leishmania* spp.*Infect Immun*. 2002; **70(5):**2288-2296.
31. Scotland RS, Stables MJ, Madalli S, Watson P, Gilroy DW. Sex differences in resident immune cell phenotype underlie more efficient acute inflammatory responses in female mice. *Blood*, 2011; **118(22):**5918–5927.
32. Al-Khayat, Z, Agha NF, Alharmni KI. Gender differences in the severity and features of lesions among cutaneous Leishmaniasis patients.*J.Contemp Med Sci*.,2019; **5(6):**336-342.
33. Seaad A, Abduula S, Kelef S. Epidemiological prevalence of Cuteanous Leishmainasis in immigration in Al-Qadissyia province. *Al-Anbar J. of Veterinary Sciences,* 2017;**15(1):** 77-83.
34. Hlavacova J, Votypka J, Volf P. The effect of temperature on *Leishmania* (kinetoplastide: Trypanosomatidae) developmentin sand fly. *Med Entomol*.,2013; **50(5):** 955-958.
35. Amin TT, Al-Mohammed HI, Kaliyada F, Mohammed BS. Cutaneous Leishmaniasis in Al Hassa, Saudi Arabia: Epidemiological trends from 2000 to 2010. *Asian PCC J Trop Med*,2013; **6(8):**667-672.
36. Tiwary P, Kumar D, Mishra M, Singh RP, Rai M, Sunda S.Seasonal variation in the prevalence of sand flies infected with *Leishmania donovani .Plosone*.,2013; **8(4):**1-8.
37. Al-Tawfiq JA, Abukhamsin A. Cutaneous leishmaniasis, a 46-year study of the epidemiology and clinical features in Saudi Arabia (1950-2002). *Int .J. Infect. Dis*.; 2004; **8(4):**244-250.

38. Moosazadeh M, Afshari M, Parsaee MD, Gharkameh A, Nezammahalleh A, Abedi Gh, Fakhar M, Mahdavi S, Shojaei J, Enayati A, Clinico- epidemiological features of Cutaneous leishmaniasis in Provine, northern *Iran. Clinical Mazandaran Epidemiology and Global Health.*, 2019; **7:**378-381.
39. Al-Samarai AAM, d Saher H. Cutaneous leishmainasis in Iraq. *The journal of Infection in Developing Countries*, 2009; **3(02)** :123-129.
40. Sharifi F, Zarean M, Kermanizadeh A. Distribution and molecular identification of spartial *Leishmania* species from Endomic foci of south-eastern *Iran. Iranian J Parasitol*.,2012; **7(1):**45-60.
41. Kumar A, Samant M. DNA vaccine against visceral leishmaniasis a promisingapproach of prevention & control. *Prasit.Immunol*.,2016; **38(5):**273-281.
42. Duszak P,Cunninham AA, Hyatt AD. Anthropogenic environmental changes and the emergence of infectious diseases in wildlife. *Acta Trop.*, 2000; **78:**103-116.
43. Sakhaei Sh, Darrudi R, Motaarefi H, Sadagheyani H,. Epidemiology Study of Cutaneous Leishmainasis in Neyshabur Country, East of Iran(2011-2017). *Journal of Medical Science.*,2019; **7(21):** 3710-3715.
44. Qasim MT, Al-Mayali HK. Investigate the relation between Baicalin effect and Gene expression of LH, FSH, Testosterone in male rats treated with Gemcitabine drug. Research Journal of Pharmacy and Technology. 2019 Sep 30;12(9):4135-41.
45. Qasim MT, Al-Mayali HK. The immunological and protective role of Baicalin in male rats treated with chemotherapy (Gemcitabine). InJournal of Physics: Conference Series 2019 Jul 1 (Vol. 1234, No. 1, p. 012065). IOP Publishing.
46. Tahmasebi S, Qasim MT, Krivenkova MV, Zekiy AO, Thangavelu L, Aravindhan S, Izadi M, Jadidi-Niaragh F, Ghaebi M, Aslani S, Aghebat-Maleki L. The effects of Oxygen-Ozone therapy on regulatory T-cell responses in multiple sclerosis patients. Cell biology international. 2021 Mar 16.
47. Mousa HM, Qasim MT. Microbial Infection and IL-6 Urine Levels for Pregnant women in Thi-Qar Province. World J. Pharma. Res. 2015 Mar 6;4(05):358-65.
48. Ahmed Jassem AL-Naely, Maytham T. Qasim, Hussein Abbas Al-Hamadawi. Transfusion of Blood Components in the Newborn Service of the Hospital. Annals of RSCB [Internet]. 2021Apr.7 [cited 2021Apr.14];:952-8. Available from: http://annalsofrscb.ro/index.php/journal/article/view/2525.
49. Zainab I. Mohammed, Maytham T. Qasim. Correlation of AMH and LH Levels in PCOS Patients with Pregnancy Rate. Annals of RSCB [Internet]. 2021Apr.7 [cited 2021Apr.14];:945-51. Available from: http://annalsofrscb.ro/index.php/journal/article/view/2524.