Visceral leishmaniasis in Thi-Qar Province (Iraq) for 10 years (2003-2012)

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ABSTRACT

In Iraq, visceral leishmaniasis (VL) caused by *L. infantum* is more prevalent in south and central regions mostly in the rural areas of Iraq marshlands and usually detected in infants and children. In this study it was analyzed epidemiological data on visceral leishmaniasis (VL) recorded from 2003 to 2012 years in Iraq. The study area was included sectors of Thi-Qar province. A total of 2912 visceral leishmaniasis patients, their age from less than 1 year to 9 years, 1612(55.35%) males and 1300 (44.64%)**.** Females living in Thi-Qar province were examined in this study. Most of the cases were less than one year of age (54.01%), only (1.33%) of cases were reported in the age group between (5-9) years. Statistically, there are significant differences ($p<0.05$) among three age groups.

VL was distributed in all sectors of Thi-Qar, but Shatra sector had the highest rate 797(27.36%), the lowest one was recorded in Nasseria 1 sector 200 (6.86%). Statistically, there are significant differences ($p<0.05$) among all sectors of Thi-Qar. Each patient was examined clinically and parasitology. As in conclusion, VL is endemic in Thi-Qar governorate, it is more prevalent in rural areas 2456 (84.34%) than in urban one 456 (15.65%), this differ between two regions may be due to the difference of the various behaviors of the vectors and the different life style of the inhabitants.

Key words: Visceral leishmaniasis (VL), Epidemiological survey, Thi-Qar Province (Iraq)

INTRODUCTION

The leishmaniases are a spectrum of different diseases caused by more than 20 species and subspecies of parasites belonging to the genus *Leishmania*. Approximately 350 million people in 88 countries are exposed to these parasites which cause an estimated 12 million infections worldwide ***(Guerin et al. 2002; WHO, 2002).*** The disease is widespread and may cause serious health problems in communities throughout the Mediterranean regions and the Middle East, including Iraq ***(Herwaldt, 1999; Hepbum, 2003)*** Visceral leishmaniasis (VL) caused by geographic variants of the *Leishmania donovani* complex (*L.*

donovani, L. infantum, L. chagasi), is a progressive wasting disease of dog and humans that is often fatal if untreated ***(Baneth, 2006).***

In Iraq, visceral Leishmaniasis is recognized as important public health problem, it is one of the most important endemic diseases in Iraq and is known to occur since (1916) when first infection with *Leishmania* was recorded ***(Kadhim et al. 1978; Sukkar, 1978).*** In Iraq, the disease was found to be more prevalent in the central region and mostly in the rural village area and southern governorates close to Iran border which report. The highest incidence of all cases reported in Iraq ***(Kadhim et al. 1978; Sukkar, 1978).*** Visceral Leishmaniasis is a childhood disease and occurring in place where health services are poorly developed. Poor socioeconomic conditions are associated with higher risk of infection ***(Cerf et al. 1987).***

The emergence of the VL in focuses is the result of increase geographical areas of risk, movement of susceptible population in to existing endemic area, proliferation of sand fly that resistant to used insecticides, increase in reservoir population as a result of agriculture development projects ***(Thakur, 2000; Melby, 2004).*** The objective of this study was to determine the incidence of VL in Thi-Qar province.

Materials and Methods

A total of 2912 visceral leishmaniasis patients lived in Thi-Qar province were diagnosed by serological dipstick rk39 test and analyzed for this study. The study area included all sectors of Thi-Qar Province southern Iraq. Figure (1).

The period of observation was 10 years from 2003 to 2012. All the necessary in formations for patients were collected. The chi-square ($\chi 2$) test was used as a test of significance. The differences were recorded as significant whenever probability (p) was less than 0.05 SPSS (1999).

Figure (1): *A Map Thi-Qar Province, Showing the sectors distribution*

RESULTS

In the present study, 2912 VL cases were clinically and parasitological positive for VL in Thi-Qar province during the period ten years ago 2003-2012. Table (1), illustrates the distribution of VL cases according to age and sectors. Most of the cases were less than one year of age (54.01%) and (1.33%) of cases were reported in the age group between (5-9) years. Statistically, there are significant differences ($p<0.05$) among three age groups. Among the 2912 cases of visceral leishmaniasis from Thi-Qar, Shatra sector had the highest rate 797(27.36%), and the lowest one was in Nasseria 1 sector 200 (6.86%). Statistically, there are significant differences ($p<0.05$) among all sectors of Thi-Qar. Figure (2, 3).

Table (1): *Distribution of VL cases in Thi-Qar Province according to age and Province sectors during years (2003-2012)*

Age group*	**No. of cases**	**%**
< 12 month	1573	54.01
> 12-60 month	1300	44.64
> 60 month	39	1.33
Total	2912	100
Sector**	**No. of cases**	**%**
Chebayish	579	19.88
Nasseria 1	200	6.86
Nasseria 2	209	7.17
Refaii	664	22.80
Shatra	797	27.36
Suq-Al-Sheiukh	463	15.89
Total	2912	100

***$\chi 2$=1351.4 df= 2 p<0.05 **$\chi 2$=610.1 df= 5 p<0.05**

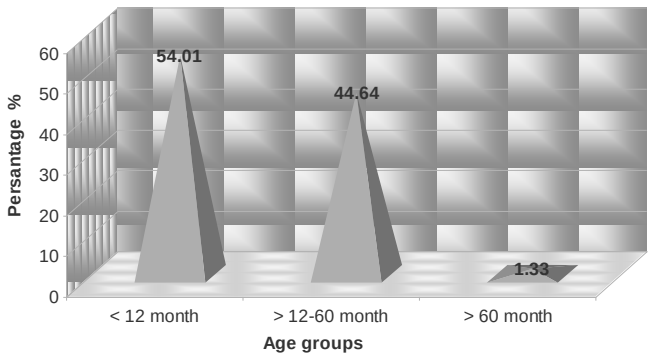

Figure (2): *Prevalence of VL cases according to age group during years (2003-2012)*

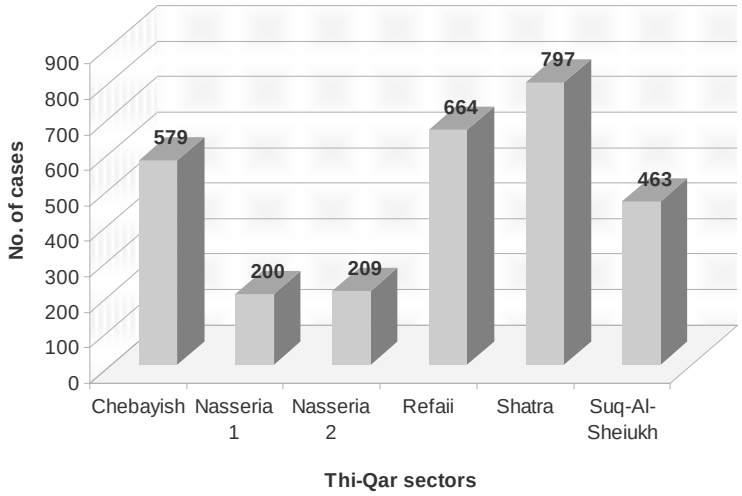

Figure (3): *Geographical distribution of VL cases in Thi-Qar Province during years (2003-2012)*

The percentage of all cases in males 1612(55.35%) was more than females 1300 (44.64%). Table (2). Statistically, there are significant differences ($p<0.05$) between males and females infections in Thi-Qar Province. It is more prevalent in rural areas 2456(84.34%) than in urban one 456(15.65%).Table (3), There are significant differences ($p<0.05$) between rural and urban distribution of VL cases.

Table (2): *Records of VL cases according to sex in Thi-Qar Province during years (2003-2012)*

Years	Female		Male		Total	
	No. of cases	%	No. of cases	%	No. of cases	%
2003	375	44.48	468	55.51	843	28.94
2004	340	45.63	405	54.36	745	25.58
2005	139	38.71	220	61.28	359	12.32
2006	87	47.02	98	52.97	185	6.35
2007	33	36.26	58	63.73	91	3.12
2008	52	53.60	45	46.39	97	3.33
2009	27	49.09	28	50.90	55	1.88
2010	47	48.95	49	51.04	96	3.29
2011	117	43.33	153	56.66	270	9.27
2012	83	48.53	88	51.46	171	5.87
Total	1300	44.64	1612	55.35	2912	100

$\chi 2=90.34$ df=1 $p<0.05$

Table (3): *VL cases in rural and urban regions of Thi-Qar Povince during years (2003-2012)*

Years	Rural		Urban		Total	
	No. of cases	%	No. of cases	%	No. of cases	%
2003	723	85.76	120	14.23	843	28.94
2004	600	80.53	145	19.46	745	25.58
2005	314	87.46	45	12.53	359	12.32
2006	162	87.56	23	12.43	185	6.35
2007	80	87.91	11	12.08	91	3.12
2008	82	84.53	15	15.46	97	3.33
2009	49	89.09	6	10.90	55	1.88
2010	75	78.12	21	21.87	96	3.29
2011	239	81.48	31	18.51	270	9.27
2012	151	88.30	20	11.69	171	5.87
Total	2456	84.34	456	15.65	2912	100

$\chi 2=1635.52$ df=1 $p<0.05$

DISCUSSION

Visceral leishmaniasis (VL) is mostly seen in the rural suburban areas of cities ***(Sukkar, 1983).*** Thi-qar province is one of the southern regions in Iraq showing a rise in the number of cases. The cases that were reported in 1988 were not more than 26, while in 2000. The number was more than 529 cases, most of infected children were below 5 years old, and most of the cases were reported in Al-Fuhood and Al-Dawaya sub-districts ***(El-Edan, 2001).***

During the last 10 years, there were increases in VL cases in Thi-Qar province, it was recorded that 2912 cases during period 2003-2012, about more than a half of these cases were less than one year old. Many villages of Thi-Qar province are a rural area with high humidity of the soil and the increase geographical areas of risk by environmental modification as agriculture and irrigation projects ***(El-Edan, 2001; Melby, 2004).*** Renewing of marshes in southern part of Iraq (Maysan and Thi-Qar provinces) which can change the humidity of the soil, vegetation and tempertature these factors probably lead to changes of sandflies density and provide a suitable environment for breeding of sand flies, as well as increase in rodent population. Moreover, high density of stray dogs and wild canines are present in the surrounding villages which regarded as a reservoir host ***(Jassim, 1998; Abdul-Majeed, 2001; Mahdi, 2004; Gani, 2006; Jarallah, 2009).*** In Sudan, it was found that rainfall is an important variable for increasing the density

of the sand flies ***(Thomson et al. 1990).***

The age distribution of the reported cases showed that the disease affected mainly infants and children less than 12 months (54.01%) and up to 60 months (44.64%) respectively. The same result was obtained by other studies in south of Iraq ***((Jassim, 1998; Abdul-Majeed, 2001; Mahdi, 2004; Gani, 2006; Jarallah, 2009).*** and neighboring ***(Edrissian et al. 1988; Rageh, 1990; Al-Orainey et al. 1994).*** The reason of higher prevalence rate in younger age in the present study is probably due to the fact that they have poorly developed immune system at an early stage of life.

In Iraq about 17 species of sand fly were identified by ***Pringle (1985)*** and ***Sukkar (1985).*** In Iraq the species of the vector sand fly is still not very well solved. ***Sukkar (1983)*** was suggested that both *P.papatasi* and *P.alexandri* might be the vector. Many researchers referred that the sand flies vectors *ph. papatasi* might be the vector of VL in Basrah ***(Niazi, 1980; Mahdi, 2004).***

VL cases occurred in males (55.35%) were higher than that recorded in females (44.64%) which is similar to other studies in Iraq and other regions ***(Niazi, 1980; Kumar et al. 1999; Thakur, 2000; Ali et al. 2003; Mahdi, 2004, Gani, 2006)*** In recent study, Jarallah (2009) demonstrated the high Infection rate of males than females in sero-epidemiological study in marshlands villages of Basrah, Maysan and Thi-Qar governorates southern Iraq was probably due to the culture habits of the area where the females use well covered dresses, which decrease the chance of sandfly bites. Moreover, the females are obliged to be home before evening. Males usually wear exposed clothes and play in farm that introduces more chance for exposure to the bite of sand fly, also sleep without shirts during summer exposing themselves to sandflies. In Maysan province, ***Al-Alak (1997)*** showed that the ratio of VL infection between male and female was 1: 0.75. The VL among Al-Najaf children, males cases were 114(59, 6%) females cases were 77(40.3%), Male: female ratio was 1.5:1 ***(Majeed, 2001).***While; ***Alwan (1985)*** concluded that both sexes were almost equally affected when he reviewed 1560 cases in Baghdad. ***Pringle (1956)*** suggested that Jackals and foxes might play an important role as a reservoir host of VL in Iraq, because of their wide distribution in the country and their habits which bring them close to human habitation. The first isolation of *Leishmani*a from possible reservoir hosts was made in 1980 from dog in Shuhaimiya, southeast of Baghdad ***(Sukkar et al. 1981; Sukkar, 1983).*** In Iraq the jackal is the principal reservoir ***(Marquardt et al. 2000).*** In other report that the domestic dogs are the reservoir host for *L. donovani* ***(Sukkar, 1985).*** In an Iranian study parasitological and

serological examinations that were performed in 30 wild canines should that 10% of these animals were infected by *L. infantum* which is isolated from 10 domestic dogs, one jackal, one fox and one wolf ***(Mohebali et al. 2006).*** The number of cases that was reported in the last ten years (2003-2012) was 2912 cases; about 797 (27.36%) of them were from Shatra sector. In conclusion, VL is endemic in Thi-Qar governorate, it is more prevalent in rural areas 2456(84.34%) than in urban one 456(15.65%), this differ between two regions may be due to the difference of the various behaviors of the vectors and the different life style of the inhabitants. VL is common among the poor people living in the rural villages in Thi-Qar sectors in marshes such as people of Chebayish sector, Theses people usually live in the mud poor houses having cracked walls which constitute condition for attraction and hiding of sand flies. Moreover, majority of these people sleep outside their houses during the summer without bed nets, that situation is favorable for sand fly to bite and transmit the infection. The people are usually illiterate and lack knowledge about the disease, its vector, as well as the preventive aspects and treatments available.

References

Abdul-Majeed, M.K. (2001): Kala-azar complications in Missan province. Iraqi. J. Comm. Med., 14(2): 142-145.

Al-Alak, S.F. (1997) : Study of the epidemiology of visceral leishmaniasis (kala-azar) in Al-Magger District-Missan province. M.Sc. Theses Coll. Vete. Med. Univ. Baghdad, Iraq.

Ali, S.H.; Al-Bashir, N.T and Al-Tmiri, D.M. (2003): Clinical and epidemiological study of visceral leishmaniasis in group of hospitalized children in Baghdad. Iraqi Post Med. J.; 2(4): 371-377.

Al-Orainey, I.O.; Gasim, I.Y.; Singh, L.M.; *et al*. (1994): Visceral leishmaniasis in Gizan, Saudi Arabia. Ann. Saudi Med. J.; 14(5): 396-398.

Alwan, S.J. (1985) : The present status of visceral leishmaniasis in Baghdad city. M.Sc. Thesis. College of Medicine .University of Baghdad.

Baneth, G. (2006) : Canine leishmaniasis. In Greene, editor. Infectious diseases of the dog and cat. 3rd ed. St. Louis (MO): Saunders/Elsevier. 696-8.

Cerf, B. J.; Jones, T. C.; Badaro, R. *et al*. (1987) : Malnutrition as a risk factor severe visceral leishmaniasis. J. Infect Dis.; 156: 1030-1033.

Edrissian, G. H. ; Hafizi, A.; Afshar, A. *et al*. (1988) : An endemic focus of Visceral leishmaniasis in Meshkin-Shahr, east Azerbaijan of Iran and IFA serological survey f the disease in this area. Bul. Soc. Pathol. Exot. Filiales, 81(2): 238-248.

El-Edan, A.Y. (2001): Kala-azar. Al-fuhood subdistrict Thi-Qar

governorate, epidemiological, serological and ecological study. M.Sc. Thesis, Coll. Med. Univ. Basrah. Iraq.

Gani, Z.H. (2006) : Visceral leishmaniasis in Barah: Clinical and sero-epidemiology study. Ph. D. thesis Coll. Med. Univ. Basrah. Iraq.

Guerin, P.J.; Olliaro, P.; Sundar, S.; Boelaert, M.; Croft, S.L.; Desjeux, P.; Wasunna, M.K.and Bryceson, A.D.M. (2002): Visceral leishmaniasis: current status of control, diagnosis, and treatment, and a proposed research and development agenda. Lancet Infect Dis. 2(8): p. 494-501.

Hepbum, N.C. (2003). Cutaneous leishmaniasis: an overview. JPGM, 49:50-54.

Herwaldt, B.L. (1999): Leishmaniasis. The Lancet. 354: 1191-1199.3

Jarallah, H. M. (2009): Epidemiological and immunological study on visceral leishmaniasis in marshlands villages South of Iraq. Ph.D thesis Coll. Edu. Univ. Basrah. Iraq.

Jassim, A.H. (1998): The evaluation and application of locally prepared direct agglutination test for the diagnosis and sero-epidemiology of visceral leishmaniasis Basrah. Ph.D thesis Coll. Med. Univ. Mustansirya. Iraq.

Kadhim, A.H.; Sukkar, F.J.; Al-Maghazachi, S.J. and Qawal, D. (1978): Evaluation of the role of foxes and jackals as possible reservoir host of visceral leishmaniasis in central Iraq. Tech. Bull., 20: 3-8.

Kumar, R.; Kumar, P.; Chowdhary, R.; Pai, K.; Mishra, C.; Kumar, K.; **Pandey,H.; Singh, V. and Sundar, S. (1999):** Kala-azar epidemic in variance district. India. Bull WHO, 77(5): 371-374.

Mahdi, D.S. (2004): Epidemiology and serologicalstudies on visceral leishmaniasis in southern Iraq. Ph.D thesis Coll. Edu. Univ. Basrah. Iraq.

Majeed, M.N. (2001): Visceral leishmaniasis in Al-Najaf children. Kufa. Med. J., 4: 278-284 .

Marquardt, W.C; Demaree, R.S and Grive, R.B. (2000): *Leishmania* and leishmaniasis, In "parasitology and vector biology". Academic press, London. Pp 57-70.

Melby, P. C. (2004): Leishmaniasis (Leishmania). In: Behrman RE, Kligman RM. Jenson HB (Eds). Nelson Textbook of Pediatrics. 17th ed. W. B. Saunders company, USA.; 1130-1133.

Mohebali, M. ; Edrissian, G.H. ; Nadim, A. ; Hajjaran, H. ; Akhoundi, B. ; Hooshmand, B. ; Zare, Z. ; Arshi, S. Mirsamadi, N. ; Naeini, K.M. ; Mamishi, S. ; Sanati, A.A. ; Moshfe, A.A. ; Charehdar, S. and Fakhar, M. (2006): Application of DAT for the diagnosis and seropidemiological studies of VL in Iran. Iranian. J. Parasitol., 1: 15-25.

Niazi, A.D. (1980): Studies in the epidemiology and sero-epidemiology of visceral leishmaniasis in Iraq. PH.D Thesis. Univ. London.

Pringle, G. (1956): Kala-azar in Iraq. Preliminary epidemiological consideration. Bull. End. Dis. Iraq; 1: 275-294.

Pringle, G. (1985): Kala-azar in Iraq. Preliminary epidemiological consideration. *Bull. End. Dis. Iraq*., 1: 275-294.

Rageh, H. A. (1990): Visceral leishmaniasis in the Yemen-a report of 72 cases in Tazi. Saudi Med. J.; 11: 105-107.

Spss (1999): Spaa for Windows. 10. Spss .

Sukkar F. (1983): Epidemiology of leishmanisis in Iraq. Bull. End. Dis., 22: 33-50.

Sukkar, F. (1978): Kala-azar in Iraq. Bul. End. Dis. Iraq, 19:29-38.

Sukkar, F. (1985): Isoenzyme studies of Iraqi *Leishmania*. *Bull. End. Dis. Iraq*., 26:71-80.

Sukkar, F. (1985): Leishmaniasis in the Middle East. Change, K.P and Bary R.S. eds.. *Elsevier science publishers*: 223 pp.

Sukkar, F.; Al-Mahdawi, S.; Al-Doori, N. and Khadhumi, J. (1981): Isolation of Leishmania from spleen of a dog in Iraq. Trans. Roy. Soc. Trop. Med. Hyg.; 75: 829-860.

Thakur, C. P. (2000): Socioeconomic of visceral leishmaniasis in Bihar (India). Tran. Roy. Soc.Trop. Med. Hyg.; 94: 156-157.

Thomson, M.C.; Elnaiem, D.A.; Ashford, R.W.and Connors, S.J. (1999): Towards a kala-azar risk map for Sudan: mapping the potential distribution of Phlebotomus orientalis using digital data of environmental variables. Trop. Med. Int. Health; 4(2): 105-113.

WHO (2002): Oral miltefosine may revolutionize treatment of visceral leishmaniasis: Report of WHO ex pert committee. 2- TDR. Series No. 68.