



## Distribution of Endemic Parasitic Diseases in Iraq

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**T**HIS study came as an update on communicable parasitic diseases in Iraq. Leishmaniasis, echinococcosis and toxoplasmosis are the most serious communicable ones with important socio-economic problems. The present study was done during 2021. The study area included all Iraqi provinces, the analysis of all cases has been taken into account for more than ten years ago from 2011 to 2020. The distribution of parasitic communicable diseases in that period included four parasitic diseases; toxoplasmosis, leishmaniasis (cutaneous and visceral) and echinococcosis. Communicable parasitic diseases were classified according to provinces, total number of echinococcosis, toxoplasmosis, cutaneous leishmaniasis (CL) and visceral leishmaniasis (VL) recorded 6364, 7097, 89359 and 4453, respectively, CL (89359) was the highest communicable disease and the lowest one was VL (4453), with significant differences ( $p < 0.05$ ). Echinococcosis (6364) and toxoplasmosis (7097) infections were high without significant differences ( $P > 0.05$ ). Sex distribution of communicable parasitic diseases during 2011-2020 were done. In conclusion, this study indicates that communicable parasitosis is endemic in Iraq, it is more prevalent in rural areas than in urban one; because of the environmental factors which play an important role for increasing the chances of infection.

**Keywords:** Communicable diseases, Toxoplasmosis, Leishmaniasis, Echinococcosis, Iraq.

### Introduction

A zoonotic disease is a disease spread between animals and people. It can be caused by viruses, bacteria, parasites, and fungi, some of these diseases are very common. Zoonotic diseases caused by parasites, the symptoms of the communicable parasitic diseases can be different depending on the parasite and man. Toxoplasmosis, leishmaniasis and echinococcosis are considered to be one of the most serious communicable parasitic diseases with important socio-economic problem. It affects both man and livestock [1-3]. A systematic approach to the control of communicable diseases is a key component of humanitarian response. Leishmaniasis is one among the six most important vector-borne diseases worldwide. There are different forms of leishmaniasis, caused by different species

of *Leishmania*, some forms of leishmaniasis are anthroponotic (transmitted only between humans), while others are zoonotic (involving an animal reservoir). The disease is endemic in warm tropical and subtropical climatic conditions and has been reported from 88 countries of the world. It is a zoonotic disease in most regions in which it occurs [4]. Many species of *Leishmania* infect humans; the biological cycles and epidemiological interrelationships between vector, reservoir, humans, climate and ecology are highly variable. Echinococcosis, is one of the most important problems, for public health, economic losses and zoonotic diseases in many parts of the world [5, 6]. It has for many years been a manifestation of parasitic infection which can potentially lead even to death [7]. The stray dogs, as a definitive host, of the adult *Echinococcus granulosus*, play the

most important role in spread of infection, in the Middle-East countries, via contamination of the environment with its eggs. *Toxoplasma gondii* is a protozoan parasite causes zoonotic disease prevalent worldwide called Toxoplasmosis [3]. The commonest typically asymptomatic parasitic infection in humans was due to the immune system usually kept the parasite from causing illness [3, 8]. However, women newly infected with *Toxoplasma* during or shortly before pregnancy and anyone with a compromised immune system should be aware that toxoplasmosis can have severe [9]. The present study aimed to give an up-data on communicable diseases in Iraq.

### Materials and Methods

The study was done during the year 2021 included all Iraqi Provinces from Douhok to Basrah. A triangle region bound by Basrah, Maysan and Thi-Qar was included marshes regions. Data recorded by Communicable Diseases Control Center (CDC), and Iraq Ministry of health on communicable parasitosis

were collected from all MOH Health Province records from 2011-2020.

Statistical analysis: Data were computerized and analyzed using Statistical Package for Social Sciences (SPSS). Significance level was considered P was <0.05 [10].

### Results

The distribution of communicable parasitosis from 2011 to 2020 was given in table (1). Parasitic diseases were classified according to provinces shown in Fig. (1 & 2).

The CL had the highest number 89359 cases, and the lowest one was for VL 4453 cases. Statistically there are significant differences ( $p < 0.05$ ). Table (2) illustrates a sex distribution of communicable diseases. Statistically there are significant differences ( $p < 0.05$ ) in number of cases between sex.

Annual distribution of communicable diseases in Iraq are presented in table (3) and Fig. (3). The highest number of the cases was recorded for CL 18854 (21%) cases in 2017, while the

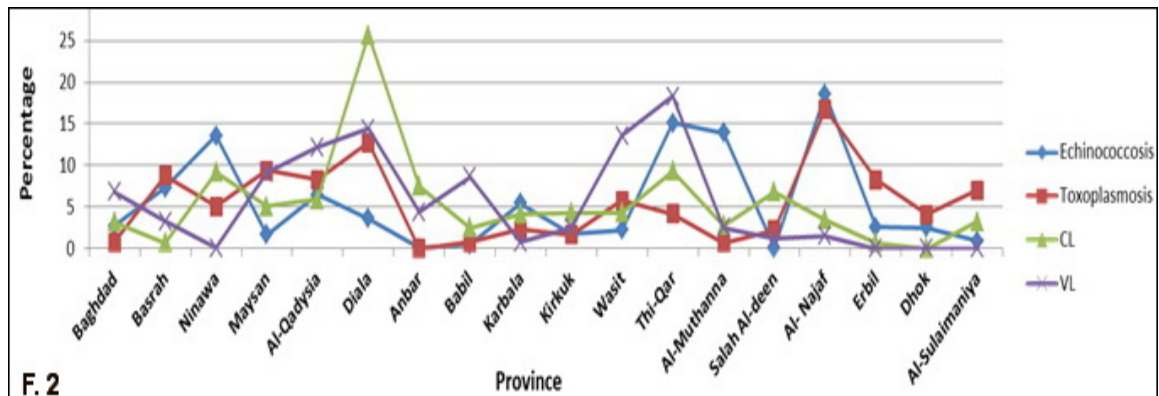
TABLE 1. Communicable parasitic diseases in Iraq during 2011-2020 according to Province.

Provinces	Echinococcosis		Toxoplasmosis		Cutaneous leishmaniasis		Visceral leishmaniasis	
	Human/ intermediate host		Human/ intermediate host		Human/ Final host		Human/ Final host	
	No.	%	No.	%	No.	%	No.	%
Baghdad	173	2.7	61	0.8	2912	3.2	303	6.8
Basrah	469	7.3	631	8.8	683	0.7	149	3.3
Ninawa	870	13.6	362	5.1	8268	9.2	8	0.1
Maysan	109	1.7	671	9.4	4579	5.1	408	9.1
Al-Qadysia	420	6.5	590	8.3	5314	5.9	545	12.2
Diala	231	3.6	908	12.7	23044	25.7	644	14.4
Anbar	12	0.1	1	0.01	6713	7.5	199	4.4
Babil	37	0.5	62	0.8	2293	2.5	386	8.6
Karbala	347	5.4	170	2.3	3766	4.2	40	0.8
Kirkuk	116	1.8	121	1.7	3925	4.3	114	2.5
Wasit	143	2.2	418	5.8	3889	4.3	607	13.6
Thi-Qar	966	15.1	304	4.2	8353	9.3	815	18.3
Al-Muthanna	885	13.9	55	0.7	2578	2.8	112	2.5
Salah Al-deen	8	0.1	159	2.2	6080	6.8	55	1.2
Al- Najaf	1190	18.6	1197	16.8	3164	3.5	67	1.5
Erbil	167	2.6	592	8.3	712	0.7	0	0
Dhok	163	2.5	297	4.1	63	0	0	0
Al-Sulaimaniya	58	0.9	498	7	3023	3.3	1	0
Total	6364	100	7097	100	89359	100	4453	100



F. 1

Fig. 1. Map of Iraq.



F. 2

Fig. 2. Communicable parasitic diseases in Iraq during 2011-2020 according to Province.

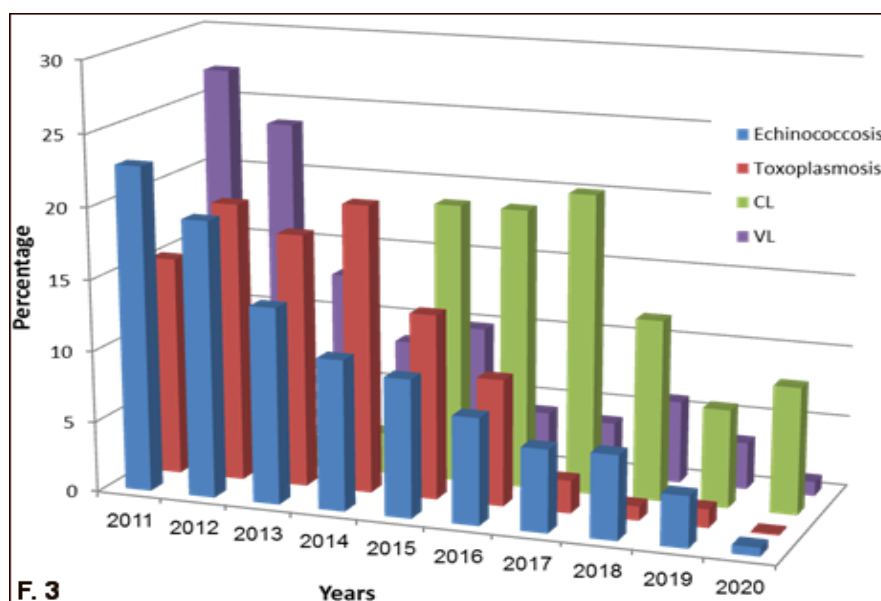
TABLE 2. Sex distribution of communicable parasitic diseases in Iraq during 2011-2020.

Year	Echinococcosis Human/ intermediate host		Toxoplasmosis Human/ intermediate hos		Cutaneous leishmaniasis Human/ Final host		Visceral leishmaniasis Human/ Final host	
	F	M	F	M	F	M	F	M
2011	901	550	1091	5	1326	1720	552	655
2012	788	452	1392	0	1167	1336	513	534
2013	558	323	1244	23	726	927	274	302
2014	434	241	1363	75	1243	1372	187	189
2015	411	209	833	94	8448	9077	212	225
2016	310	168	612	20	7825	9756	92	91
2017	279	93	168	1	8250	10604	78	94
2018	262	114	75	0	5073	6353	122	137
2019	142	88	86	7	2808	3391	73	77
2020	31	10	8	0	3540	4417	21	25
Total	4116	2248	6872	225	40406	48753	2124	2329

M= Male, F= Female

**TABLE 3. Recorded cases of communicable parasitic diseases in Iraq.**

Year	Echinococcosis Human/ intermediate host		Toxoplasmosis Human/ intermediate host		Cutaneous leishmaniasis Human/ Final host		Visceral leishmaniasis Human/ Final host	
	No.	%	No.	%	No.	%	No.	%
2011	1451	22.8	1096	15.4	3046	3.4	1207	27.1
2012	1240	19.4	1392	19.6	2503	2.8	1047	23.5
2013	881	13.8	1267	17.8	1653	1.8	576	12.9
2014	675	10.6	1438	20.2	2615	2.9	376	8.4
2015	620	9.7	927	13	17525	19.6	437	9.8
2016	478	7.5	632	8.9	17581	19.6	183	4.1
2017	372	5.8	169	2.3	18854	21	172	3.8
2018	376	5.9	75	1	11426	12.7	259	5.8
2019	230	3.6	93	1.3	6199	6.9	150	3.3
2020	41	0.6	8	0.1	7957	8.9	46	1
Total	6364	100	7097	100	89359	100	4453	100

**Fig. 3. Recorded cases of communicable parasitic diseases in Iraq.**

lowest number of the cases was recorded for toxoplasmosis 8 (0.1%) cases in 2020. Statistically, these differences were significant at ( $p < 0.05$ ).

### Discussion

Communicable parasitic diseases are widely distributed in tropical and subtropical areas [11, 12]. The epidemiological aspects and clinical manifestations of the communicable parasitic diseases are broad spectrum. This study was undertaken to analyze all cases operated

upon over a period of ten years ago. Data information inferred from the hospitals records is still considered the most dependable source of information for parasitic communicable diseases.

In Iraq there are several studies that were done concerning the epidemiology of leishmaniasis, echinococcosis and toxoplasmosis communicable diseases [7,8,13-15]. According to the World Health Organization, leishmaniasis is one among the six most important vector-borne diseases worldwide [12,16].

The present study shows the total infection with communicable diseases, echinococcosis, toxoplasmosis CL and VL in Iraq for 10 years ago were (6364, 7097, 89359, 4453) respectively, CL (89359) was the highest infection among other communicable parasitic diseases, more cases recorded in marshland regions in Thi-Qar province 8353 (9.3%) in agreement with other studies that recorded high infection with CL infection in Iraq marshland regions [17,18]. Thi-Qar province was recorded highest prevalence of infection with cutaneous and visceral leishmaniasis (9.3%, 18.3%) respectively, when compared with other provinces, high prevalence of infection in Thi-Qar province may be due to the risk factors that increase the spread of leishmaniasis, the role of the climate change in the emergence and re-emergence of human infectious disease and particularly vector or borne diseases is well recognized, temperature and humidity are the two most important climatic factors [19, 20]

Echinococcosis in Iraq is caused by *E.granulosus* which is hyper endemic [21] and considered to be one of the most serious helminthes diseases [1,2]. When compared between echinococcosis (6364) and toxoplasmosis (7097) infections during ten years ago, it was found that the highest infection rate was for toxoplasmosis, the statistical analysis showed no significant differences ( $p>0.05$ ) among them. The prevalence of infection with toxoplasmosis was higher in al Al-Najaf Province 1197 (16.8%), in other hand, there are significant differences ( $p<0.05$ ) in rate of cases among provinces for ten years [15, 8]. The infection with toxoplasmosis can lead to significant and progressive diseases with high morbidity and mortality in fetuses and newborns [3, 9]. In the United States it is estimated that 11% of the population 6 years and older have been infected with toxoplasmosis. In various places throughout the world, it has been shown that more than 60% of some populations have been infected with toxoplasmosis [2, 3].

During 10 years ago both CL and VL occurred more in males (48753, 2329) than females (40406, 2124) respectively, Table 2. This result was agreement with those reported by others [13, 22]. Leishmaniasis is occurring in places where health services are poorly developed; poor socioeconomic conditions are associated with a higher risk of infection [23,19]. The high infection rate of males may be due to the work of males in farm where

exposure to the sand flies bite [17, 18]. In contrast with echinococcosis and toxoplasmosis that reported higher numbers in females (4116, 6872) respectively. These differences may be explained on the basis of variation among diseases with regard to factors such as the vector and reservoir animals, climatic, human host and socioeconomic status [24, 9]. There are many factors that play an important role in the presence and distribution of communicable parasitic diseases in Iraq [24], including the presence of marshes; the presence of vectors such as sand flies, anopheles; animal reservoirs such as dogs, rodent and environmental risk factors. Furthermore, the changes in the human host, low socioeconomic status increased in immunosuppression and malnutrition [16, 19, 20, 25].

In the present study, the highest rate of toxoplasmosis was (20.2 %) in 2014, while the highest incidence rate of cutaneous leishmaniasis was 21 % in 2017. The differences in distribution of communicable diseases may be explained by the environmental risk factor, temperature, humidity, vegetation, vectors, animal's reservoirs and socioeconomic status [3, 19]. The role of the climate in the emergence and re-emergence of human infectious disease and particularly vector or borne diseases is well recognized, temperature and humidity are the two most important climatic [26, 20]. Also, human component such as behavioral activities or houses design were identified as factors for leishmaniasis [23], or it might be due to the level of developed immunity and the marshlands environmental rural regions where risk factors dog, sand fly, rodent and jackal are found. Moreover, the areas of marshlands are regarded as suitable environmental for the growth reproduction of sandflies, the style of the house building which helps in the development of the larval stages of the sand flies in cracks of the walls and land [20, 27]. In conclusion, this study indicates that communicable parasitosis is endemic in Iraq, it is more prevalent in rural area than in urban one; because of the environmental factors which play an important role for chance of infection.

#### Acknowledgement

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#### Conflict of Interest

There is no conflict of interest.



### Funding statement

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### توزيع الأمراض الطفيلية المتوطنة في العراق

هند مهدي جارالله<sup>١</sup> و حيدر إزاعطي عبادي<sup>٢</sup>

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هذه الدراسة جاءت تحديثاً للأمراض الطفيلية الانتقالية في العراق. داء الشمانيا، داء القطط وداء الاكياس المائية هي اغلب الامراض الانتقالية الخطرة مع المشاكل الاقتصادية الاجتماعية المهمة. تمت الدراسة الحالية خلال الفترة ٢٠٢١. تضمنت منطقة الدراسة كل محافظات العراق، تم تحليل كل الحالات لأكثر من عشر سنوات مضت من ٢٠١١ الى ٢٠٢٠. تضمن توزيع الامراض الطفيلية الانتقالية في تلك الفترة اربع امراض طفيلية: داء القطط، داء الشمانيا (الحشوي والجلدي) وداء الاكياس المائية. صُنفت الامراض الطفيلية الانتقالية وفقاً للمحافظة، سُجل العدد الكلي لداء الاكياس المائية، داء القطط داء الشمانيا الجلدي وداء الشمانيا الحشوي ٦٣٦٤، ٧٠٩٧، ٨٩٣٥٩ و ٤٤٥٣. تبعاً. داء الشمانيا الجلدي (٨٩٣٥٩) كان اعلى الامراض الانتقالية، وكان اقلها داء الشمانيا الحشوي (٤٤٥٣)، مع وجود اختلاف معنوي ( $p < 0.05$ ). الإصابة بداء الاكياس المائية (٦٣٦٤) وداء القطط (٧٠٩٧) كان مرتفع بدون وجود اختلاف معنوي ( $P > 0.05$ ). تم توزيع الامراض الطفيلية الانتقالية حسب الجنس خلال الفترة من ٢٠١١-٢٠٢٠. ختاماً، اشارت هذه الدراسة الى ان الامراض الطفيلية الانتقالية هي من الامراض المتوطنة في العراق، وهي سائدة في المناطق الريفية اكثر من الحضرية، يعود السبب في ذلك للعوامل البيئية التي تلعب دور مهم في زيادة فرص الإصابة.