

**LEISHMANIASIS AMONG SOLDIERS OF STABILIZATION
FORCES IN IRAQ
REVIEW ARTICLE**

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ABSTRACT

The results of studies concerning the incidence of leishmaniasis among soldiers of Stabilization Forces serving in Iraq in the years from 2003 to March 2004 are presented in this article, in the light of a possibility of importation of this disease to the countries of their origin.

Epidemiology, clinical picture, laboratory diagnosis, treatment and prevention of leishmaniasis are described.

In mid-2004, more than 2400 Polish soldiers served in Iraq. By the end of June 2004 no case of leishmaniasis was diagnosed among them.

Among American troops serving in Iraq, 653 cases of cutaneous and 2 cases of visceral leishmaniasis were reported by the end of March 2004. According to the U.S.

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sources, the number of infected American soldiers could have been higher, from 750 to 1250 or even more, what made up to nearly 1% of U.S. troops serving in Iraq in 2003-2004.

Cases were reported also among Ukrainian soldiers.

Key words: leishmaniasis, soldiers of Stabilization Forces, Iraq

INTRODUCTION

Leishmaniasis is a parasitic disease transmitted by sand flies (the bite of infective female phlebotomine sand flies) and caused by obligate intracellular protozoa of the genus *Leishmania*. Human infection is caused by about 21 of 30 species that infect mammals. These include the *Leishmania donovani* complex with 3 species (*L. donovani*, *L. infantum* and *L. chagasi*); the *L. mexicana* complex with 3 main species (*L. mexicana*, *L. amazonensis* and *L. venezuelensis*); *L. tropica*, *L. major*, *L. aethiopica* and the subgenus *Viannia* with 4 main species *L. (V.) braziliensis*, *L. (V.) guyanensis*, *L. (V.) panamensis* and *L. (V.) peruviana* (3,6,18).

Epidemiology

Leishmaniasis is found in parts of about 90 countries. Approximately 350 million people live in these areas, in the tropics and subtropics, in Asia, Europe, Africa, North, Central and South America. It is not found in Australia and in Oceania (1,3,11).

Human leishmanial infections can result in 2 main forms of disease: cutaneous (CL) and visceral (*kala-azar*, VL). The factors determining the form of the disease include leishmanial species, geographic location, and immune response of the host. Based on geographical distribution, cutaneous leishmaniasis is divided into Old World and New World leishmaniasis. More than 90% of the world's cases of cutaneous leishmaniasis occur in Afghanistan, Algeria, Brazil, Iran, Iraq, Peru, Saudi Arabia, and Syria. More than 90% of the world's cases of visceral leishmaniasis occur in Bangladesh, Brazil, India, Nepal, and Sudan.

Leishmaniasis usually is more common in rural than urban areas, but it is found in the outskirts of some cities. The risk of infection is the highest between dusk and dawn. Adventure travelers, missionaries, soldiers have an increased risk for leishmaniasis, especially the cutaneous form. Even persons with short stays in leishmaniasis-endemic areas can become infected. The number of new cases of cutaneous leishmaniasis each year in the world is thought to be about 1.5 million. The number of new cases of

visceral leishmaniasis is thought to be about 500 000. There has been a sharp increase in recorded cases over the last ten years (3, 6, 11,17).

Clinical picture

Cutaneous leishmaniasis (CL) is characterized by one or more skin sores (either painful or painless, with or without a scab) that develop weeks to months after a person is bitten by infected sand flies. If untreated, the sores can last from weeks to years and often eventually develop raised edges and a central crater. Some people have swollen glands near the sores (e.g., if the sores are located on the arm or hand). While the Old World species mostly cause benign and often self-limiting cutaneous disease, the (New World) American species cause a broad spectrum of conditions from benign to severe manifestations, including mucosal involvement. The sores can change in size and appearance over time.

The manifestations of visceral leishmaniasis (VL) such as fever, weight loss, enlargement of the spleen and liver, pancytopenia and hypergammaglobulinemia, typically develop months, but sometimes years, after a person becomes infected. If untreated, symptomatic visceral leishmaniasis typically is fatal. Some patients develop post kala-azar dermal leishmaniasis (6,7,11,18).

Laboratory diagnosis

In the past, the disease could be inferred from geographical setting or determined by performing culture and isoenzyme analysis. Nowadays widely available PCR technology allows a rapid diagnosis with determination of most species. Blood tests are very helpful in diagnosis of leishmaniasis (usually anemia, low white blood cell and platelet count).

Examination of Giemsa-stained slides of the relevant tissue (CL – skin sore; VL – bone marrow, spleen, liver, lymph node, blood) is still the technique most commonly used to detect the parasite. Other diagnostic techniques except for mentioned PCR (molecular technology) which allow parasite detection and/or species identification are biochemical (isoenzymes) and immunologic (immunoassays) approaches (1,3).

Treatment

First-line drugs:

Pentavalent antimonials such as Pentostam, Glucantime (20mg/kg/day for 20-28 days).

Side effects from therapy of pentavalent antimonials: fatigue, arthralgia, myalgia, headache, and acute pancreatitis.

In case of resistance, second-line drugs are used:

Ketokonazole, Amphotericin B, Aminosidine plus Pentavalent antimonials or Pentamidine isethionate (1,18,20).

Prevention

Vaccines and drugs for preventing infections are not currently available.

Preventive measures are aimed at reducing contact with sand flies:

1. Limit outdoor activity from dusk to dawn, when sand flies are the most active.
2. Buildings should have window screens or other barriers to keep sand flies from entering.
3. Avoid the bites of sand flies using protective clothing and insect repellents:
 - wearing long-sleeved shirt, long pants and socks, loose-fitting clothing to prevent sand flies bites through thin fabric,
 - using both skin and clothing repellents: for exposed skin 30-35% DEET (N,N-diethyl-metatoluamide). DEET can not be used underneath clothing. Avoid DEET contact with eyes, lips, and broken or irritated skin. For clothing: Permethrin aerosol spray (one application remains effective through 5-6 washes of clothing),
 - using bed net while sleeping.

Although sand flies are primarily nighttime biters, infection can be acquired during the daytime if resting sand flies are disturbed. Sand fly activity in an area can easily be underestimated because sand flies are noiseless fliers and rare bites might not be noticed (11,13,14,18).

LEISHMANIASIS IN IRAQ

In The Middle East, cutaneous leishmaniasis commonly occurs in Israel, Jordan, Lebanon, Syria, Iraq, Iran, southern Turkey, northern and southern Saudi Arabia, and Yemen (11,17).

Visceral leishmaniasis is reported from parts of Cyprus, Israel, Lebanon, Jordan, Syria, Iraq, Iran, southern Turkey, northern and southern Saudi Arabia, and the neighbouring Arab countries of Bahrain, Qatar, United Arab Emirates, Oman and Yemen (11,17).

Both cutaneous and visceral leishmaniasis are endemic in Iraq.

In 2001, the Iraqi health authorities reported 625 cases (2,3 per 100 000 population) of cutaneous leishmaniasis (CL) and 2893 cases (10,9 cases per 100 000) of visceral leishmaniasis (VL).

Two species of the genus *Leishmania* responsible for cutaneous leishmaniasis are present in Iraq – *Leishmania major*, agent of zoonotic CL (ZCL) and *Leishmania tropica*, agent of anthroponotic CL (ACL) (17,20).

Humans are the sole proven reservoir of ACL and the disease is transmitted from person to person through the parasitic vector (probably *Phlebotomus sergenti*). Untreated persons are the main source of infection. In ZCL, gerbils seem to be the main animal reservoir and *Phlebotomus papatasi* is the probable vector. Incubation of disease is at least a week, up to many months. ACL usually has a longer incubation than ZCL. Almost all cases of cutaneous leishmaniasis in Iraq are ZCL (20).

ACL occurs mainly in the suburban areas. The highest incidence is noted in the poor suburbs of Mosul, where bad sanitary conditions promote breeding and laying eggs by sand flies, and where high population density increases exposure to the vector. ZCL is present in rural areas throughout the country, but mostly in the northern and western regions.

Transmission of both ACL and ZCL occurs from May to October.

The most important endemic area of visceral leishmaniasis (VL) is central Iraq and the Greater Baghdad area. Since 1991 the disease has extended to new areas rarely affected before, such as Missan, Thi-Qar and Basrah regions in south-eastern Iraq. The vector of VL is still not known. *Phlebotomus alexandri* has been identified in VL foci. Visceral leishmaniasis shows a marked seasonality. The transmission period is between May and October. The peak in the number of new cases is between December and January.

Main risk factors for increased transmission of cutaneous and visceral leishmaniasis are:

- population movement (refugees, displaced people),
- overcrowding,
- poor access to health services,
- food shortages (malnourished people),
- lack of improved water supply and poor sanitation,
- man-made environmental changes (building of dams, irrigation systems) (20).

LEISHMANIASIS AMONG COALITION FORCES IN IRAQ

In Operations Desert Shield and Desert Storm in Iraq and Kuwait from 1990 to 1991, among 697 000 deployed military personnel, Walter Reed Army Medical Center (WRAMC) in the District of Columbia, USA, identified 12 cases of so-called viscerotropic leishmaniasis caused by *L. tropica* (a syndrome associated with visceral infection but not necessarily the classic clinical manifestations of VL) and 20 cases of CL (8,9).

From August 2002 to September 2003, WRAMC identified 22 cases of CL among personnel participating in Operations Enduring and Iraqi Freedom in Southwest and Central Asia (Afghanistan, Kuwait, Iraq). 18 cases came from Iraq, mainly from the urban and periurban areas of An Nasiriyah and Baghdad. The patients had stayed in these areas for 21-150 days (median 60 days) before skin lesions were first noted. All patients were treated in WRAMC with sodium stibogluconate (Pentostam) – 20 mg/kg/day by intravenous infusion for 20 days and recovered (2,5,21).

By the end of March 2004, doctors of the Walter Reed Army Medical Center and the infectious disease wards of hospitals have seen 653 cases of cutaneous leishmaniasis. Sudden increase of disease cases occurred after homecoming of American soldiers from Iraq. Increase of disease incidence during Operation Iraqi Freedom was associated with arrival of American soldiers during the peak season for sand flies, and long duty of troops in Iraq. Particularly high incidence of leishmaniasis cases occurred in units which stationed on the Iran – Iraq border, where more than 200 out of 750 soldiers came down with leishmaniasis during 10-month tour that ended in March 2004 (16).

By the end of March 2004, 2 cases of visceral leishmaniasis among Stabilization Forces soldiers in Iraq were reported, both among Americans (16).

It was estimated that number of infected U.S. soldiers could have been higher, from 750 to 1250 or even more, what made up to nearly 1% of the U.S. troops serving in Iraq in 2003-2004. According to U.S. data, this was the largest outbreak of leishmaniasis among American troops in the history of the military since World War II (15). During World War II, the U.S. forces suffered 630 cases of leishmaniasis in the Karum River Valley in Iraq in a 3-month period (17).

The disease is difficult to diagnose without a laboratory and experts equipped to look for it. All leishmaniasis smears were sent to the Walter Reed Army Institute of Research for confirmation (15).

Cutaneous leishmaniasis should be suspected in any individual with a chronic ulcerative skin disorder, especially the one refractory to at least one week antibiotic treatment (Augmentin 875 mg twice daily is recommended), and lesions found predominantly in exposed skin areas lasting longer than 3 weeks (4).

All suspected cases of cutaneous leishmaniasis based on the criteria listed above should be biopsied by standard techniques used at the Combat Support Hospital in Baghdad. Non-US coalition personnel can also use these techniques at this Hospital.

Upto the end of March 2004, five cases of leishmaniasis were reported among Ukrainian soldiers serving in the Multinational Division Centre South in Iraq, in Wasit province.

The DNA analysis of these soldiers for the *Leishmania* parasites was done by polymerase chain reaction (PCR) at the Walter Reed Army Institute of Research in Washington DC (USA). All of them had positive results (10). They were treated in the Ukrainian Field Hospital in Al-Kut.

In 2004, more than 2400 Polish soldiers served in the Multinational Division Center South in Iraq, in Karbala, Babil and Wasit provinces. By the end of June 2004, no cases of leishmaniasis were reported among Polish troops.

Health care providers should consider the possibility of cutaneous leishmaniasis in persons with chronic skin lesions who were deployed to Southwest/Central Asia or who were in other areas where leishmaniasis is endemic, and that of visceral leishmaniasis in such persons with persistent, febrile illnesses, especially if associated with other manifestations suggestive of kala-azar, e.g., splenomegaly and pancytopenia (6,20).

KEY MESSAGES

1. By the end of March 2004, 653 cases of cutaneous leishmaniasis and 2 cases of visceral leishmaniasis were reported among American soldiers serving in Iraq in 2003-2004. It was estimated that the number of infected U.S. soldiers could have been higher, from 750 to 1250 or even more, what made up to nearly 1% of American troops serving in Iraq in 2003-2004.
Leishmaniasis infected American soldiers were sent for further treatment to the United States.
2. By January 2004, 5 cases of cutaneous leishmaniasis were reported among Ukrainian soldiers serving in Wasit province in Iraq. They were treated in the Ukrainian Field Hospital in Al.-Kut.

3. By the end of June 2004, no cases of leishmaniasis were reported among Polish soldiers serving in the Multinational Division Center South in Iraq, in Karbala, Babil and Wasit.
4. Any patient with a non-healing lesion for longer than 3-4 weeks needs to be suspected of having cutaneous leishmaniasis. These patients need to be placed on a course of antibiotic therapy for 7-10 days. If the lesion has persisted or worsened, patients should be biopsied for histopathological examination. Patients with persistent, febrile illnesses, associated with splenomegaly and pancytopenia should be suspected of having visceral leishmaniasis.

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