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Original Article

Incidence, Burden, and Trend of Cutaneous Leishmaniasis over Four Decades in Iran

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Abstract

Background: Iran is among the first six countries in the world with the highest annual incidence of cutaneous leishmaniasis. This study aimed at estimating the incidence, burden, and trend of cutaneous leishmaniasis at the national level in Iran from 1977 to 2015.

Methods: This study was conducted in 2017, used Disability Adjusted Life Years (DALYs) index, recommended by the WHO for assessing the Global Burden of Diseases, to estimate the burden of cutaneous leishmaniasis. The data on the incidence of the disease and the number of cases was obtained from the communicable diseases surveillance system (Center for Communicable Diseases Control (CCDC), Ministry of Health and Medical Education (MOHME) of Iran) that routinely collects data from all over the country; in addition, some data was extracted by reviewing the texts. Considering the views expressed in a panel of experts, to calculate the actual incidence of the disease, the number of registered cases was multiplied by 5.

Results: The incidence of cutaneous leishmaniasis varied from approximately 50 to 250 cases per 100,000 population during the studied period. During these years, the incidence of the disease was higher in males than females. Moreover, the burden of cutaneous leishmaniasis varied between 1.18 and 5.7 DALYs per 100000 population during the studied period. The incidence and burden of cutaneous leishmaniasis have not significantly decreased in recent years.

Conclusion: Despite the implementation of a program for controlling cutaneous leishmaniasis in Iran since 1977, the incidence and burden of the disease are still high in the country; it is seriously alarming for policy makers and managers of the health system in Iran, indicating the presence of some problems in controlling the disease.

Keywords: Cutaneous leishmaniasis; Incidence; Disability adjusted life year (DALY); Burden; Iran

Introduction

Leishmaniasis is a common zoonotic disease which is occurring in 98 countries in the world (1). Generally, the disease has three main types, including visceral, cutaneous (most prevalent),

and mucocutaneous (2). Cutaneous Leishmaniasis is endemic in 88 countries (3). According to the WHO's report, about 1.3 million people are diagnosed with cutaneous leishmaniasis annually. In 2015, the highest incidence of cutaneous leishmaniasis was observed in Syria, Afghanistan, Brazil, Iraq, Iran, Pakistan, Colombia and Algeria (Table 1) (4). However, the actual annual incidence of cutaneous leishmaniasis in Syria, Brazil, Colombia, and Algeria is estimated to be between 2.8 and 4.6 times higher than the reported cases. Moreover, in Afghanistan, it is estimated to be between 5 and 10 times higher than the reported cases (4). In all countries, the actual incidence of the disease is estimated to be much higher than the reported cases (3, 5).

Table 1: Number of cases of cutaneous leishmaniasis reported in 2015 in 10 top countries

No.	*Country*	*Total cases*
1	Syrian Arab Republic	50972
2	Afghanistan	29392
3	Brazil	19395
4	Iraq	18884
5	Iran (Islamic Republic of)	18607
6	Pakistan	16647
7	Colombia	7541
8	Algeria	7523
9	Tunisia	6611
10	Peru	5459

Despite the efforts made to combat cutaneous leishmaniasis, the disease is still present in many countries as an endemic disease. Because of the complexity of the epidemiological and biological aspects of cutaneous leishmaniasis, controlling this disease in endemic areas is much more difficult than controlling other infectious diseases. In Iran, during some periods of time, there had been a reduction in the number of new cases of infection in endemic areas attributed to the national plans' focus on the disease. However, in spite of adopting many preventive measures, the disease still exists in different parts of the country. Due to the presence of carriers and reservoir hosts of cutaneous leishmaniasis in most parts of Iran, it is likely to observe the spread of the disease to the clean areas of the country. For instance, in the past few years, it has spread to some disease-free areas of the country (1, 6, 7).

Although cutaneous leishmaniasis is not usually associated with mortality, the burden of the disease can be significant due to its high incidence rate, malformed skin lesions, and permanent scars that remain after standard treatments (8). Accordingly, detailed information on the burden of the disease at the national level can help policymakers and health system managers to properly allocate the limited health care resources to control the disease. Disability-adjusted life years (DALYs) index is introduced by the WHO as a general way to quantify the burden of diseases (9-11).

The burden of leishmaniasis is not equal in different parts of the world and even within a country. It can also change over time. Therefore, accurate information on the burden of the disease at the national and regional levels is necessary for policy-making and appropriate allocation of resources.

This study aimed at estimating the incidence, burden, and trend of cutaneous leishmaniasis at the national level over the past four decades in Iran.

Methods

The cutaneous leishmaniasis-related DALYs was calculated using a method developed by the WHO for the assessment of the Global Burden of Diseases (11, 12). Based on the data, since there was no reported case of death of leishmaniasis-induced during the studied years, the total number of DALYs from the disease was attributed to the Years of Life Lost due to disability (YLDs). The YLDs was calculated by multiplying the annual incidence of cutaneous leishmaniasis (I) by the average duration of the disease until remission or death (D) and by its disability weight (DW)(13, 14).

YLD= I ×D×DW

Based on the findings of the literature review and comments obtained in the panel of experts, the average length of the disease was considered to be 1 year (1). In addition, the disease weight was set to be 0.023 (9, 11). In this study, the cases were not weighted in terms of age. A discount rate of 0.03 was used over the future years to consider the time preferences (15).

The data on the incidence and mortality of the disease was obtained from the communicable diseases surveillance system (Centre for Communicable Diseases Control (CCDC), Ministry of Health and Medical Education (MOHME); in addition, some data was extracted from the literature. Because of under-reporting and incomplete coverage of the leishmaniasis surveillance system, the number of diagnosed cases was multiplied by 5 in order to estimate the real incidence of the disease. The data on the population of the country during the studied years was obtained from the Statistical Center of Iran (16). Data were analyzed using Excel software (ver. 2010).

Results

Table 2 presents the actual incidence and burden of cutaneous leishmaniasis by sex between 1977 and 2015. Following the recommendation presented in the national guideline for Cutaneous Leishmaniasis, the reported cases were multiplied by 5 to estimate the actual incidence of the disease. Figure 1 presents the incidence of cutaneous leishmaniasis per 100,000 population by sex in Iran during 1977-2015. The incidence of cutaneous leishmaniasis ranged from approximately 50 to 250 cases per 100000 population during the studied period. During the studied years, the incidence of the disease in males was higher than that in females.

Figure 2 presents the changes in the burden of cutaneous leishmaniasis per 100,000 population by sex in Iran during 1977-2015. The trend of DALY-related of cutaneous leishmaniasis follows the trend of the incidence of the disease.

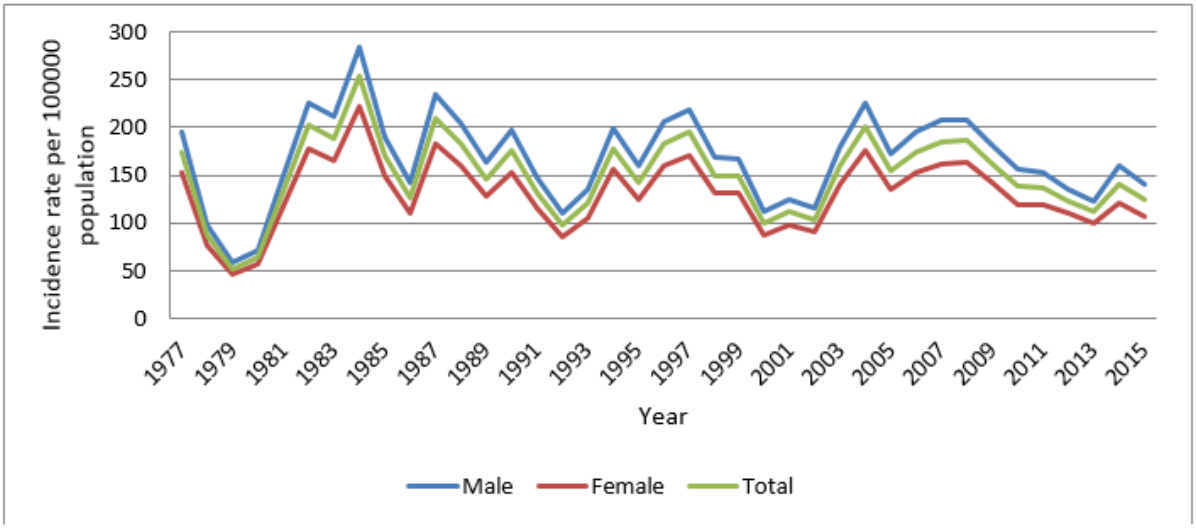

Fig. 1: Incidence of cutaneous leishmaniasis per 100,000 population by sex in Iran during 1977-2015

Table 2: Incidence and burden of cutaneous leishmaniasis by sex during 1977-2015

Year	*Number of estimated cases in males*	*Number of estimated cases in females*	*Estimated incidence rate per 100000 population*	*Total DALYs in males*	*Total DALYs in females*	*Total DALYs in both sexes*	*DALYs per 100,000 population*
2015	56390	41590	124.40	1271	937	2208	2.80
2014	63280	46501	141.03	1426	1048	2474	3.18
2013	48085	37675	111.47	1084	849	1933	2.51
2012	52495	41210	123.24	1183	929	2112	2.78
2011	58685	44265	136.99	1322	998	2320	3.09
2010	58870	43510	137.97	1327	981	2307	3.11
2009	67402	50847	161.41	1519	1146	2665	3.64
2008	76522	57727	185.62	1724	1301	3025	4.18
2007	75589	56867	185.50	1703	1282	2985	4.17
2006	69803	52782	173.89	1573	1189	2763	3.92
2005	60942	46117	154.26	1373	1039	2413	3.48
2004	78353	59232	201.46	1766	1335	3101	4.55
2003	61278	46332	160.12	1381	1044	2425	3.61
2002	39088	29557	103.80	881	666	1547	2.34
2001	41268	31257	111.44	930	704	1634	2.52
2000	36438	27429	99.73	821	618	1439	2.24
1999	53787	40528	149.65	1212	913	2125	3.37
1998	53068	39914	149.93	1196	899	2095	3.37
1997	67942	51278	195.35	1531	1156	2687	4.40
1996	62742	47408	183.41	1414	1068	2482	4.14
1995	48023	36137	141.18	1082	814	1897	3.21
1994	59038	44552	177.57	1330	1004	2334	4.01
1993	39473	29778	12046	890	671	1561	2.71
1992	31778	23973	98.40	716	540	1256	2.22
1991	41753	31489	131.17	941	710	1651	2.96
1990	54578	41173	175.44	1230	928	2158	3.95
1989	44375	33476	146.21	1000	754	1754	3.29
1988	54008	40743	182.40	1217	918	2135	4.11
1987	60563	45688	209.65	1365	1030	2394	4.72
1986	35768	26983	126.91	806	608	1414	2.86
1985	43463	32788	169.90	979	739	1718	3.83
1984	62273	46978	252.92	1403	1059	2462	5.70
1983	44603	33648	188.22	1005	758	1763	4.24
1982	46028	34723	201.81	1037	782	1820	4.55
1981	29213	22038	133.08	658	497	1155	3.00
1980	13751	10374	64.33	310	234	544	1.45
1979	10873	8202	52.24	245	185	430	1.18
1978	17656	13319	87.12	398	300	698	1.96
1977	34343	25908	174.04	774	584	1358	3.92

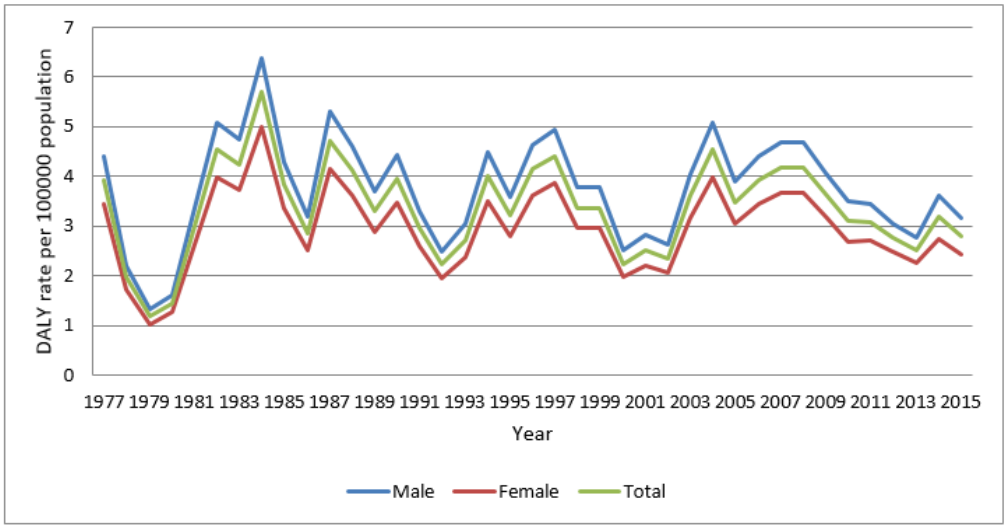

Fig. 2: Burden of cutaneous leishmaniasis per 100,000 population by sex in Iran during 1977-2015

According to the data obtained from the MOHME, no cases of death of cutaneous leishmaniasis was reported during the studied years; hence, 100% of the DALYs caused by cutaneous leishmaniasis were attributed to YLDs.

Fig. 3 presents the share of males and females of different age groups in the burden of cutaneous leishmaniasis in2015. The highest burden of the disease was observed in 5-29 yr age group. In all the age groups, the burden of the disease was higher among males than females.

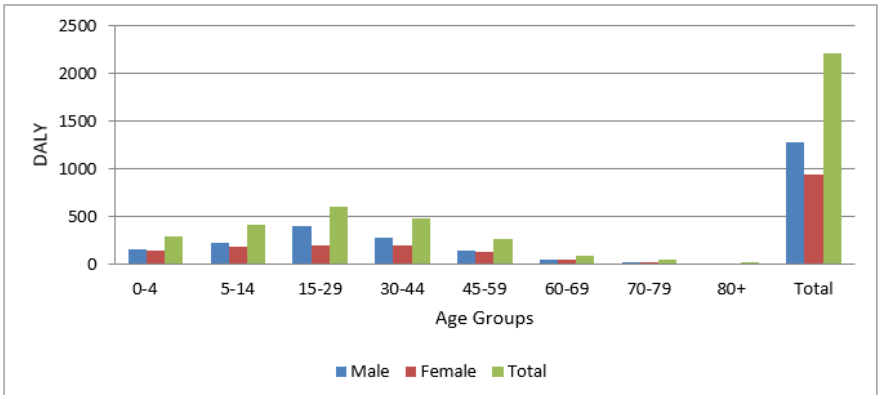

Fig. 3: Share of each sex in the burden of cutaneous leishmaniasis by age in 2015

Discussion

Based on the results of this study, the incidence of cutaneous leishmaniasis fluctuated between 1977 and 2015, but it has had a decreasing trend in recent years. In Iran, the National Leishmaniasis Control Program was introduced in 1977. Ever since case detection is actively and regularly performed in new infected areas (17). However,

these programs have not been as effective as expected and it has spread in areas where it has not been endemic earlier, attributed to the following factors: lack of political commitment and financial support for leishmaniasis control programs, inadequate health training, migration from villages to cities and the expansion of suburb areas, increased exposure of humans to the Leishmania parasites, stop of malaria control programs that resulted in the discontinuation of the spraying leading to the survival of the leishmania mosquitoes, and the emergence of drug-resistant forms of the disease (1, 17). Despite the fact that Iran had been successful in controlling and eliminating diseases like malaria, this disease is still a high-risk infectious problem in Iran. Despite the successful control of some other infectious diseases, the high incidence of this disease in Iran is considered as an alarming issue.

In this study, the incidence of the disease was higher in males than females, which is consistent with the results of other studies (8, 1, 18). Males, as compared with females, are more likely to work outdoor, rest in open spaces, and let more parts of their body to be bare.

The study results also showed that the burden of cutaneous leishmaniasis between 1977 and 2015 was in line with the incidence of the disease because no mortality from the disease was reported during these years. However, the burden of cutaneous leishmaniasis has decreased in recent years. The burden of cutaneous leishmaniasis in Iran in 2013 in males and females, respectively, was 53.7 and 41.7 DALYs per 100000 population; in our study, it was 1084 DALYs for males and 849 DALYs for females. The difference might be attributed to the fact that the burden of the disease in our study was estimated based on the actual incidence of the disease (the reported number of cases was multiplied by 5), while, in another study, DALYs were calculated based on the reported incidence of the disease. The reported incidence is largely underreported. Furthermore, the long-term burden of the disease was calculated with regard to the persistence of lesions caused by cutaneous leishmaniasis according to Iran's life expectancy table, with DALYs of 5957.4 and 4782.9 for males and females, respectively (8). The global burden of leishmaniasis (cutaneous and visceral) was estimated to be 3,317,000 DALYs in 2010, with a larger share being attributed to mortality from visceral leishmaniasis (10). Since the majority of cases of leishmaniasis in Iran are cutaneous, the burden of leishmaniasis in Iran is less than the global burden.

According to the findings of this study, the highest burden of the disease was observed in 5-44 yr age group. The results of a study in Iran are consistent with our findings (8). This finding is expected because this age group is more vulnerable than most other age groups as they are more outside in open spaces, and are more at risk.

In recent years, there has been a sharp decline in the incidence and burden of most infectious diseases. There are few infectious diseases, including leishmaniasis, that do not follow such a decreasing trend in their incidence and burden. The inconsistency in the incidence and burden of cutaneous leishmaniasis is also observed in all infectious diseases in countries such as Brazil, Pakistan, and Algeria. This inconsistency can be attributed to climate changes and natural disasters (4).

One of the strengths of this study is calculation of the burden of cutaneous leishmaniasis based on the actual incidence of the disease in Iran. The majority of previous studies estimated the incidence on the basis of the reported cases of the disease, while they are severely suffering from underreporting. Following the recommendation expressed in the Guideline for national cutaneous leishmaniasis surveillance system, the reported cases were multiplied by 5 to tackle underreporting of the cases (which is one of the serious limitations of previous studies) (1). In addition, the table of life expectancy in Iran was used to estimate the burden of the disease more accurately.

One of the limitations of this study is non-estimation of the long-term burden of cutaneous leishmaniasis. Even in case of full treatment, the ulcers induced by the disease cause permanent scars, hence, the burden of disease, especially its psychological burden, will be enormous. There-

fore, it is suggested to calculate the long-term burden of the disease in future studies.

Conclusion

Despite the implementation of a program for controlling cutaneous leishmaniasis in Iran since 1977, the incidence of the disease is still high in the country, indicating the inadequacy of existing programs and existing support for controlling the disease. Moreover, the burden of cutaneous leishmaniasis is high due to the permanent effects of ulcers induced by the disease. Therefore, policymakers in the health system are expected to provide serious financial and political support for the related programs to better control the disease in Iran.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflict of interest

The authors declare that there is no conflict of interests.

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