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Retrospective Study

A Five-years retrospective hospital-based study on epidemiological data regarding human Leishmaniasis in West Kordofan state- Sudan

Epidemiological of human Leishmaniasis in West Kordofan state- Sudan

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Abstract

BACKGROUND

Leishmaniasis is a neglected zoonotic disease, endemic in Sudan. Estimating this disease is very important to inform the health care policymakers and the governments to apply proper health and economic policies.

AIM

This study aimed, to find out the frequency and distribution of human leishmaniasis in West Kordofan state, based on sex and age for 5 years- Sudan.

METHODS

Five years retrospective study from 2016 through 2020 was carried out using local hospital records of leishmaniasis patients. The positive results were recorded after performing at least one of the following leishmaniasis standard tests; Direct agglutination test (DAT), Enzyme-linked immunosorbent assay (ELISA), and Leishmania Skin Test (LST). The gender and age of each patient were recorded. The collected data were analyzed using STATA package version 16.

RESULTS

A total of 162,443 patient records from 2016 to 2020 were retrieved. Of these, 4.39% were found to be positive for leishmaniasis. The disease has been more common in males (65.3%) than in females (, 34.7%). The highest reported prevalence (6.58%) was in patients 15-44 years old, which was, and the lowest prevalence (1.95%) was among patients in ≥65-year-old.

CONCLUSION

The results of the current study indicate that leishmaniasis is endemic in the study area even though the numbers of patients in the five consecutive years were varying. Besides, the disease was common in males and adults. The interpretation of

these findings should take into consideration the absence of information about some important confounding factors.

Key Words: Epidemiology; Human Leishmaniasis; West Kordofan; Sudan

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Core Tip: Five years retrospective study from 2016 through 2020 was conducted to find the frequency and distribution of human leishmaniasis in West Kordofan state, based on sex and age 5 years. A total of 162,443 patient records were retrieved. Of these, 4.39% were found to be positive for leishmaniasis. The disease has been more common in males (65.3%) than in females (, 34.7%). The highest reported prevalence (6.58%) was in patients 15-44 years old, which was, and the lowest prevalence (1.95%) was among patients in ≥65-year-old. Finally, the current study indicates that leishmaniasis is endemic in the study area even though the numbers of patients in the five consecutive years were varying. Besides, the disease was common in males and adults.

INTRODUCTION

Leishmaniasis is a parasitic zoonotic disease caused by the Leishmania parasites genus [1]. The disease is mainly transmitted by the bite of infected female phlebotomine sandflies [2]. World health organizations (WHO) classified the disease as a neglected tropical disease (NTD) [2, 3]. There are several forms of human leishmaniasis, and the most common forms are cutaneous leishmaniasis (CL), which causes skin sores, and visceral leishmaniasis (VL), which affects several internal organs (usually the spleen, liver, and bone marrow) [4]. All forms of the disease have been strongly associated with poor socioeconomic status, population displacement, a weak immune system, and

climate change [5-8]. Leishmaniasis cases have been reported in almost all continents in about 89 countries, with an estimated 700 000 to 1 million new cases occurring annually. Most cases occur in East Africa, Southeast Asia, and South America [4, 9]. Outbreaks of human leishmaniasis worldwide were reported from East African countries namely Sudan, South Sudan, and Ethiopia [10-15].

Sudan is a highly leishmaniasis endemic country (both CL and VL). The disease represents a serious health problem that may affect the whole healthcare system [16]. The geographical distributions of the disease in Sudan have high relation to the distribution of the vectors. Studies revealed that VL is endemic in the savannah area which starts from Gadarif state in the east to the White Nile State in the west, and from Kassala state in the northeast to the Blue Nile State in the south. Also, VL was reported in some scattered foci in the Kordofan states and Darfur states. Moreover, CL is found in a fluctuating pattern mainly in the northern, central, and western parts of the country [17-26].

West Kordofan is the 18th state of Sudan, it was established in July 2013 on the border with the Republic of South Sudan in the east, North Kordofan State in the North, and South Darfur State in the west. People of West Kordofan especially the Mesairya tribe continuously move to and from South Sudan where leishmaniasis disease is endemic [7]. The state also, contains many south Sudanese refugee camps spread almost all over the state. The geographical location together with the high presence of the suspected infected refugees makes the people of West Kordofan state very vulnerable to leishmaniasis for both CL and VL. A community-based study in two West Kordofan cities, namely Muglad and Babnousa, reported that out of 1781 randomly selected volunteers, 238 persons (13%) tested positive for leishmaniasis [27]. Based on that, there is still a need for a deeper look at the epidemiology of the disease in the whole state, in both males and females and in all age groups, to design and imply suitable prevention and eradication programs for the disease in the state level. Thus, this study aimed to find out the frequency and distribution of human leishmaniasis in West Kordofan state, based on sex and age for 5 years.

MATERIALS AND METHODS

The present retrospective study was conducted among patients who were admitted to any hospital in West Kordofan state -Sudan from the 1st of January 2016 to the 31st of December 2020, to test the presence of human leishmaniasis of any type in the population of West Kordofan. In addition to the clinical symptom and signs, the positive results were recorded after performing at least one of the following leishmaniasis standard tests; Direct agglutination test (DAT), Enzyme-linked immunosorbent assay (ELISA), and Leishmania Skin Test (LST).

Data of age, gender, and presence of any type of leishmaniasis were retrieved from the medical records department in the ministry of health west Kordofan, with the approval of the ministry ethical committee. The medical record department follows the guidelines of the International Classification of Diseases (ICD) 10 coding. **Statistical analysis**

Descriptive statistics and data analysis were done using STATA package version 16 (Stata Corp LLC, College Station, TX). Z test was applied to compare the proportions between the study groups and if the P-value was less than or equal to 0.05 indicates that there was a significant difference between the proportions of the two groups.

RESULTS

A total of 162,443 patient records (87847 female and 74596 male patients) from 2016 to 2020 were retrieved. Of these, 4.39% were found to be positive for leishmaniasis, 34.7% were female and 65.3% were males. The diagnostic prevalence of the infection was first founded to be very low in 2016 (2.57%), and just after one year in 2017 turned to become the highest reported prevalence at 5.83% and then start to decrease (with some fluctuation) to 3.67% in 2020 (Figure 1).

Gender-related differences in leishmaniasis prevalence are presented in Table (1), and the prevalence was significantly higher ($P \leq 0.05$) in males compared to females in the

period from 2017 to 2020, while in 2016, it didn't show any significant variation with the sex (P>0.05).

The prevalence of leishmaniasis was relatively increased with participant age in both females and males. The prevalence reached its peak in patients with 15-44 years old, which was 6.58%, then decreased to be the lowest limit of 1.95% among patients in ≥65-year-old (Tables. 2 &3).

In addition to that in all age groups, males had a higher prevalence of leishmaniasis than females.

DISCUSSION

Leishmaniasis is an endemic neglected zoonotic disease in Sudan, widespread all over the country from the eastern states to the western states, and from southern states to northern states [16]. However, a few data about the epidemiological and demographical distribution of the disease in western states is available in general and especially in west Kordofan, and it seems to be overlooked [20, 24, 25, 27], thus the current study is the first comprehensive attempt to describe the epidemiological and demographical distribution of the disease in the state.

In this study, the data on human leishmaniasis was collected from the annual health statistical reports for 5 years (2016–2020) and analyzed to show the burden of the disease in West Kordofan State, Sudan. The results highlight that a total of 162,443 people were admitted to the hospitals and health care centers in the state. Of these, 7,128 people were infected during this period. In 2016 the prevalence of leishmaniasis was found to be very low at 2.57%, surprisingly it was raised to 5.83% in 2017, and from then it seemed to decrease. The reason could be mainly since the government of Sudan October 2014 in collaboration with WHO and other related international organizations, has developed diagnostic and control strategies to limit the spread of the disease [28, 29]. The first two years 2015 and 2016 were for training the health care professional in the state, on the new diagnostic and prevention methods. That may explain the low prevalence in the first study year because of the use of the low sensitivity diagnostic

test, and then after implying the new diagnostic method in 2017 it was raised. In line with that after 2017, the prevalence of leishmaniasis is decreasing because of implying the new control strategies.

The current study found that the overall prevalence of leishmaniasis in West Kordofan was lower than that reported by Sharief *et al* [27] in 2019, this may be due to the difference in sample size and study period which both were bigger and longer respectively in the current study compared with the other study. Nevertheless, the study area could have a great impact on the result, in their study, Sharief *et al* [27] were just applied in two districts in the state but the current study collected data from all 14th districts.

Sex-related distribution of human leishmaniasis in the study revealed that males were highly affected compared to females with an overall percentage of 65.3% and 34.7% respectively. This is in line with Ali 2007 [30], Ebrahim 2016 [25], and Collis *et al* 2019 [31], and disagrees with Mohammed *et al* 2018 [20]. This result might be justified because the majority of males are nomads and they are moving seasonally to the tropic and subtropic areas in South Sudan whereby the exposure to the risk of sandflies bites is high, as well as the same exposure of the males to different agricultural areas may be a contributing factor to the infections. Consequently, males are more vulnerable than females.

Age-wise distribution found that people in the age group 15-44 had the highest prevalence among all populations similar results were reported by Awadalla 2007 [30], Osman 2011 [24], Ebrahim 2016 [25], and Collis *et al* 2019 [31], whose indicated that the adult men and women who aged between (15-44 years) were more affected by the disease compared to the lower and higher age groups. This can be put in the context that this age group is the working-age group in all fields, especially the agricultural field. In contracts that a study conducted by Mohammed *et al* 2018 [20] indicated that the most affected age groups were children between 1 and 5 years old.

In addition, the lowest reported prevalence in this study was found in the age group > 65 age. Although this group of people is more vulnerable to infections because the

immune system weakens, they have a relevant low prevalence of the disease, and the possible reason that these patients might have less exposure to the infection is due to their lifestyle which keeps them away from the areas where the carrier host is existence, especially in the agricultural areas.

This study provided important epidemiological information about the human leishmaniasis in west Kordofan, such information is missing from the scientific literature, despite its urgent need to design a collaborative effort and immediate action by the policymakers and governments (federal and state government) to prevent and eradicate programs in light of the one health concept. However, the absence of data about the infection (type, site, and status), Leishman parasite species, and other potential risk factors in some included studies are considered as limitations of the current study.

CONCLUSION

The results of the current study indicate that leishmaniasis is endemic in the study area even though the numbers of patients in the five consecutive years were varying. Besides, the disease was common in males and adults. The interpretation of these findings should take into consideration the absence of information about some important confounding factors. Further studies need to be carried out to clarify the economic impact of the disease on the public health sector in the state role of domestic animals in the epidemiology of the disease in Sudan.

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