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Prevalence of Cutaneous Leishmaniasis in Sokoto Metropolis

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ABSTRACT

Cutaneous leishmaniasis (CL) a public health issue which is associated with considerable morbidity is still a major health problem in the world especially in developing countries Nigeria inclusive. The study is aimed at determine the prevalence of Cutaneous leishmaniasis. Data was collected from the health facility client's sixty three (63) (leishmania suspect) at the outpatient department within the period of June to November 2018. leishmaniasis was diagnosed microscopically by staining thick and thin blood films on a glass slide, to visualize amastigote and promastigote of parasites intracellularly or extracellularly. Result showed that Among the 63 leishmaniasis suspect from the out-patient department for screening test, 46 (73%) tested positive to leishmaniasis (amastigote) microscopically. Among 46 leishmaniasis positive clients 29 (63%) were male and 17 (37%) were female. The age with higher prevalence was ≥ 15 years with 39 (85%) client while age ≤ 15 years were 7 (15%). Cutaneous leishmaniasis exists in Sokoto State in high proportion.

Keywords: Cutaneous leishmaniasis, Leison, Amastigote, Prevalence, Papule

INTRODUCTION

Cutaneous leishmaniasis (also known as oriental sore, tropical sore, chiclero ulcer, chiclero's ulcer or Aleppo boil, "Delhi Boil") [1,2]. Institute for International Cooperation in Animal Biologics and the Center for Food Security and Public Health [2], is the most common form of leishmaniasis affecting humans [3]. It is a skin infection caused by a single-celled parasite that is transmitted by the bite of a phlebotomine sandfly. There are about twenty species of Leishmania that may cause cutaneous leishmaniasis. This disease is considered to be a zoonosis (an infectious disease that is naturally transmissible from vertebrate animals to humans), with the exception of *Leishmania tropica* — which is often an anthroponotic disease (an infectious disease that is naturally transmissible from humans to vertebrate animals) [2]. Cutaneous leishmaniasis is endemic in all tropical and subtropical areas of the world [4]. The distribution of this disease is very tightly linked to

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geography and villages even 15 miles apart can have very different rates of cutaneous leishmaniasis. Most species of Leishmania are capable of infecting humans and causing cutaneous leishmaniasis. In the New World, these organisms include *L. amazonensis, L. braziliensis, L. guyanensis, L. lainsoni, L. lindenbergi, L. mexicana, L. naiffi, L. panamensis, L. peruviana, L. shawi* and *L. venezuelensis*. Old World species that cause cutaneous leishmaniasis include *L. aethiopica, L. infantum, L. major* and *L. tropica*. With the exception of *L. tropica* — which is commonly associated with human settlements and therefore considered to be an anthroponotic species — all of these organisms are zoonotic [5]. As demographic changes occur in developing nations, some species that have traditionally been considered to be zoonotic (e.g. *L. panamensis*) are becoming primarily human pathogens [6]. Dogs and rodents serve as the primary animal reservoir hosts in the sylvatic cycle, but people with chronic PKDL can also serve as important reservoir hosts for cutaneous leishmaniasis [7]. The most common vectors for cutaneous leishmaniasis in the Old World are sandflies of the genus Phlebotomus, while Lutzomyia and those within the family Psychodidae (especially the genus Psychodopygus) are the most common vectors in the New World. There are more than 600 species of phlebotomine sandflies, and only 30 of these are known vectors [8]. Cutaneous leishmaniasis has been seen in American and Canadian troops coming back from Afghanistan [8]. Post-kala-azar dermal leishmaniasis (PKDL) is a recurrence of kala-azar that may appear on the skin of affected individuals months and up to 20 years after being partially treated, untreated or even in those considered adequately treated [9,10]. In Sudan, they can be demonstrated in up to 60% of treated cases. They manifest as hypopigmented skin lesions (such as macules, papules, nodules) or facial redness. Though any organism causing kala-azar can lead to PKDL, it is commonly associated with *Leishmania donovani* which gives different disease patterns in India and Sudan. In the Indian variant, nodules enlarge with time and form plaques but rarely ulcerate, but nodules from the African variety often ulcerate as they progress. Nerve involvement is common in African variety but rare in Indian subcontinent. Histology demonstrates a mixture of chronic inflammatory cells; there can be macrophage or epitheloid granuloma [11]. Parasite concentration is not consistent among studies, perhaps reflecting low sensitivity of diagnostic methods used in earlier entries. Emergence of PKDL has been reported in HIV affected individuals [12] and may become a problem in future. Sodium stibogluconate alone or in combination with rifampicin is used for the treatment of PKDL for a long course of up to 4 months. Compliance can be an issue for such a long course. Mucocutaneous leishmaniasis is an especially disturbing form of cutaneous leishmaniasis, because it produces destructive and disfiguring lesions of the face. It is most often caused by *Leishmania braziliensis*, but cases caused by *L. aethiopica* have also been documented. Promastigotes of Leishmania are transmitted to human skin by the bite of a sandfly. Leishmania then invades human macrophages and replicates intracellularly. A raised, red lesion develops at the site of the bite (often weeks or sometimes years afterwards). The lesion then ulcerates and may become secondarily infected with bacteria. In many species (for example, *L. major*) the lesion often spontaneously heals with atrophic scarring. In some species (for example, *L. braziliensis*) the lesion may spontaneously heal with scarring, but then reappear elsewhere (especially as destructive mucocutaneous lesions). Lesions of other Leishmania species may spontaneously heal and then reappear as satellite lesions around the site of the original lesion, or along the route of lymphatic drainage. Some species tend to cause cutaneous leishmaniasis (e.g. *L. major* and *L. tropica*), whereas some species tend to cause visceral leishmaniasis (e.g. *L. infantum* and *L. donovani*), though emerging research (due to high deployment rates of western countries to indigenous areas) is showing these species specific presentation lines are blurring.

JUSTIFICATION OF THE STUDY

Cutaneous leishmaniasis is endemic in all tropical and subtropical areas of the world [4]. The huge increase in the spread of the disease is attributed to the refugee crises in the Middle East and West and North Africa over the past five years, particularly due to the displacement of millions of Syrian refugees and in Africa [13]. The outbreak among Syrian refugees and Sudan was documented by the World Health Organization (WHO) in 2012 and recognized as ongoing [14]. The Middle East, in 2016, seems to be experiencing an increase in the cutaneous leishmaniasis disease due to migrants fleeing the Islamic State of Iraq and the Levant. Reports of the increase in the disease have surfaced in Turkey, Lebanon and elsewhere [15,16].

OBJECTIVE OF THE STUDY

The aim and objectives of this study were therefore to determine the prevalence of leishmaniasis in Sokoto, North Western Nigeria.

SIGNIFICANCE OF THE STUDY

Results of the study would reveal the prevalence of leishmaniasis in Sokoto metropolis. Specifically, result of the study would be significant to adults (male/female), Public health officers, health counselors, health educators, curriculum planners, medical allied personnel and researchers in assessing the prevalence malaria disease and initiating preventive measures in among inhabitants would help prevention programs succeed in the populace in Sokoto metropolis.

RESEARCH QUESTIONS

- What is prevalence of leishmaniasis case in the facility?
- What is prevalence of leishmaniasis cases among children <15 years?

- What is the number of leishmaniasis case among female and male in general patients and children less than fifteen years?

HYPOTHESES

- There is no prevalence of leishmaniasis case in the facility.
- There is no leishmaniasis case among children <15 years.
- There is no leishmaniasis case among female and male in general patients and children less than fifteen years.

MATERIALS AND METHODS

Study area and the population

1Brigade Medical Centre, Gingiya barracks, Dange Shuni LGA in Sokoto South senatorial zone was be taken as study areas. By the virtue of its origin, the state comprises mostly Hausa/Fulani and other groups such as Gobirawa, Zabarmawa, Kabawa, Adarawa, Arawa, Nupes, Yorubas, Igbos and others. The Sokoto township is in dry Sahel surrounded by sandy terrain and isolated hills. Rainfall starts late that is in June and ends in September but may sometimes extend into October. The average annual rainfall is 550 mm with peak in the month August. The highest temperatures of 45°C during the hot season are experienced in the months of March and April. Harmattan a dry, cold and dusty condition is experienced between the months of November and February.

Ethical approval

This research will get ethical clearance from the Ethical Committee of the 1Brigade Medical Centre, Ginginya barrack, Sokoto and seek permission for collection data. This study was conducted in accordance with the Declaration of Helsinki and the protocol was approved by the ethical research committee of the 1Brigade medical centre, Ginginya barrack, Sokoto.

Sample size

The sample size was sixty three (63) leishmaniasis suspects at out- patients department that attended the facility between the months of June to November, 2018.

Method of data collection

The data was collected from the health facility client's (leishmania suspect) at the outpatient department within the period of June to November 2018. leishmaniasis was diagnosed microscopically by staining thick and thin blood films on a glass slide, to visualize amastigote and promastigote of parasites intracellularly or extracellularly. Briefly, the client's lesion/sore was cleaned with 70% ethyl alcohol, allowed to dry and then the lesion smears of each active lesion observed was prepared for microscopy on a glass slide. To prepare a thick blood film, a blood spot was stirred in a circular motion with the corner of the slide, taking care not make the preparation too thick and allowed to dry without fixative. After drying, the spot was stained with diluted Giemsa (1:20, v/v) for 20 min and washed by placing the film in buffered water for 3 min. The slide is allowed to air-dry in a vertical position and examination using a light microscope. As they are unfixed, the red cells lyse when a water-based stain is applied. A thin blood film was prepared by immediately placing the smooth edge of a spreader slide in a drop of blood, adjusting the angle between slide and spreader to 45° and then smearing the blood with a swift and steady sweep along the surface. The film was then allowed to air-dry and is fixed with absolute methanol. After drying, the sample is stained with diluted Giemsa (1:20, v/v) for 20 min and washed by briefly dipping the slide in and out of a jar of buffered water (excessive washing will decolorize the film). The slide was then allowed to air-dry in a vertical position and examined under a light microscope (100x objectives) [17].

Method of data analysis

Data collected were analyzed using descriptive statistic of frequency count, normative percentage.

RESULTS

Among the 63 leishmaniasis suspect from the out-patient department for screening test 46 (73%) tested positive to leishmaniasis (amastigote) microscopically **(Table 1)**.

Table 1. Showing the distribution of leishmaniasis suspect and those testing positive to leishmaniasis.

Total leishmaniasis suspect tested	Total testing positive to leishmaniasis (%)
63	46 (73)

Among 46 leishmaniasis positive clients indicated that 29 (63%) were male and 17 (37%) were female **(Table 2)**.

Table 2. Distribution of leishmaniasis positive based on gender.

Male (%)	Female (%)	Total
29 (63)	17 (37)	46

The age with higher prevalence was ≥ 15 years with 39 (85%) client while age ≤ 15 years was 7 (15%) **(Table 3)**.

Table 3. Distribution of leishmaniasis positive based on age.

≤ 15 years (%)	≥ 15 years (%)	Total
7 (15)	39 (85)	46

DISCUSSION

The results findings based on the clinical signs of the disease and the results of the diagnostic techniques, has been adequately proven that cutaneous leishmaniasis exist in north western Nigeria (sokoto State) in high proportion. 63 leishmaniasis suspect from the out-patient department tested, 46 (73%) tested positive to leishmaniasis (amastigote) **(Table 1 and Figures 1-12)**. 80% of the subject complained they had the bite at night as they slept outdoor with less covering of the body. This finding confirms the isolated reports of Obasi [18] and Ishaya et al. [19]. Although the prevalence rate in this study is contrary to that of Obasi [18] and Ishaya et al. [19] reporting 6.8%. Mutero et al. [20] reported visceral leishmaniasis to be less prevalent than malaria, with less than 2% active cases in any age group and had the same distribution in both sexes in West Pokot district of Kenya study in 1986 where a total of 2,139 people were proportionately screened for the two diseases according to four age categories (0-4, 5-14, 15-44 and greater than 45 years). The high prevalence observed in this study is because the health centre is popularly known or a referral site for leishhmaniasis in the state. However, while the initial sign of cutaneous leishmanasis (CL) found in this work begins as a tiny, milky-colored papule [21] indicating that it starts as a tiny reddish papule. The formation of milky-colored papule appearance or and reddish papule in this study was noticed at different stages of infection and the level of treatment or how it is managed contrary to the report of Ishaya et al. [19]. Furthermore, the disfiguring dark coloration of the scars pigmentation was observed in this study. There is general complain of burning, itchiness or the disgraceful, disfiguring scars on the body surfaces.

Figure 1. 8 month old boy with two and half month leishmaniasis with central macular ulcerated cutaneous lesion on the right thigh of patient in the study area.

Figure 2. 28 year old woman with two and half month cutaneous leishmaniasis lesion oozing out serous fluid after wound dressing on the lateral aspect of the patient's right ankle in the study area.

Figure 3a. The large with central ulcerated and pigmented cutaneous leishmaniasis lesion on the right knee of patient in the study area.

Figure 3b. 5 year old boy with three months leishmaniasis lesions having two large central ulcerated and pigmented papules forming cutaneous lesions on the right knee and lower thigh region of patient in the study area.

Figure 4. 27 year old man with two months leishmaniasis showing multiple ulcerated lesions with raised edges and scaly scar surrounding the cutaneous lesion on the right leg of patient in the study area.

Figure 5. 57 year old woman with three months leishmaniasis with the lesion showing fleshy papule (dry) with rashes and general inflammation of the extremity, forming cutaneous lesion on the left foot of patient in the study area.

Figure 6. 57 year old woman with one month leishmaniasis pigmented dry nodule with rashes around the nodules, forming cutaneous lesion on the left arm of patient in the study area.

Figure 7. 27 year old man with three month leishmaniasis showing an open lesion, reddish ulceration with dark pigmentation, forming cutaneous lesion on the left leg of patient in the study area.

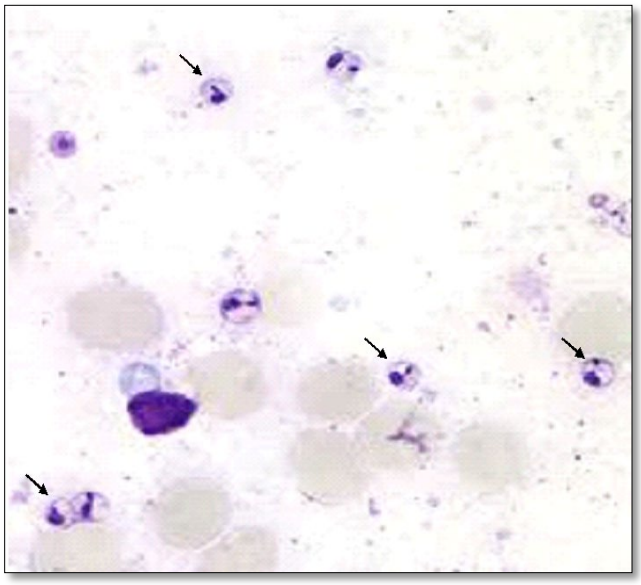

Figure 8. 100x objective of Thick film of leishmania amastigote in patient (http://www.cdc.gov).

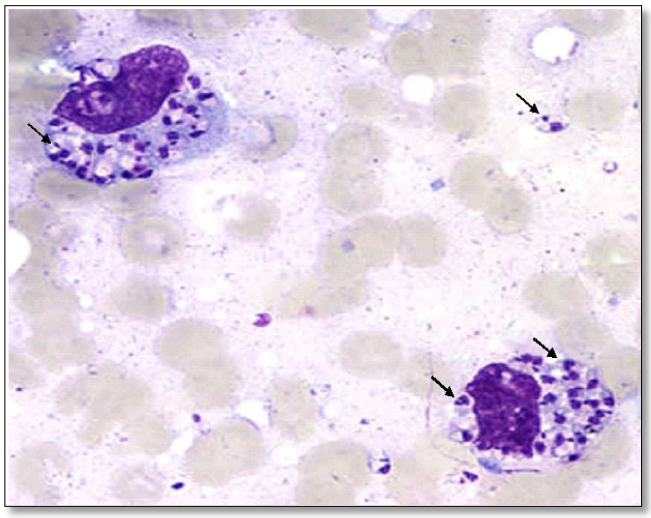

Figure 9. 100x objective of Thick film of clustered leishmania amastigote in patient (http://www.emedine.medscape.com).

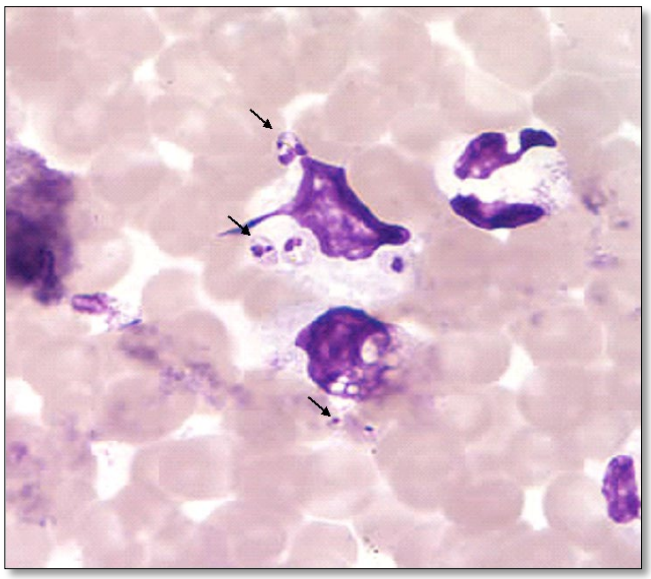

Figure 10. 100x objective of thin film of leishmania amastigote in patient (http://www.cdc.gov).

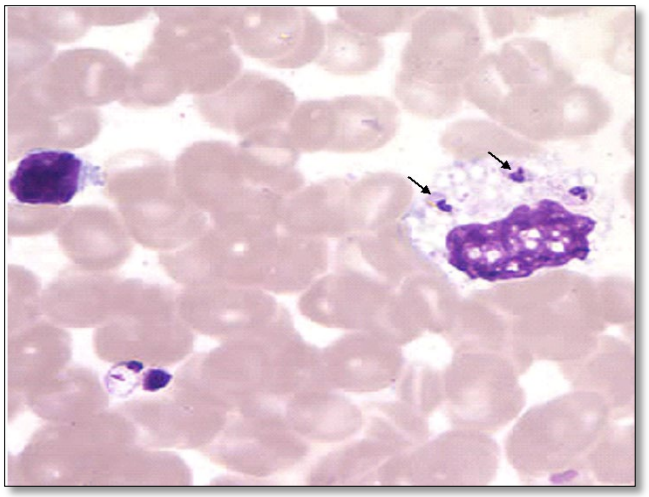

Figure 11. 100x objective of thin film of leishmania amastigote in patient (http://www.cdc.gov).

In this study it was noticed that male had higher prevalence (male 29 (63%) than female 17 (37%)) of this disease, these could be due to high predisposed the male are such as sleeping in the open space without cover (wear) because of the influence of the culture and environmental factor such as hot weather when compared to the females. This confirm the report of Weigel et al. [22] same trend in the visceral leishmaniasis and cutaneous leishmaniasis research in Ethiopia and Ecuador, while Ishaya et al. [19] reported that the incidence of CL was higher in males than in females in Northern Kaduna Nigeria and Northern Jordan respectively. While Ishaya et al. [19] reported that in southern Kaduna female had higher prevalence of leishmaniasis (Central (males=5.8%, females=11.0%) and Southern areas (males=6.0%, females 6.9%)) or about the same as in the males (Eastern area (males=5.2%; females=5.1%)), where majority of the females are relatively free from seclusion. Some researchers reported that in Northern Nigeria, which includes Sokoto State, the males were involved in farm work more than the females, who were usually secluded on account of Moslem religious practices.

It was reported that *Phlebotomus* (Phlebotomus) *duboscqui*, the transmitting vector of CL in Nigeria, exists in the Biu, Plateau, Kaduna expectedly too cold for the vector's survival. These *Phlebotomus* (Phlebotomus) *duboscqui* has migrated to Sokoto. It was noticed that 95% of the case are from Sokoto central senatorial area. Another possible reason might be the relatively denser vegetation and higher humidity in the central senatorial zone of the State, which might support a correspondingly higher population of reservoir hosts, in addition to more number of breeding places for the sandflies. Ordinarily, the disease transmitting vector, *P. duboscqui*, naturally survives in severe climatic conditions; these might have a boost of the presence of the invertebrate vectors, hence the higher point-prevalence in the region or the senatorial area.

The prevalence rate of the disease tends to be higher in the age-groups (≥ 15 years) 85% and 15% in ≤ 14 year, this is contrary to the report of Ishaya et al. [19] and Agwale et al. [23] which showed high trend in 1-15 years old, and the 10-15 years old, respectively, in Keana, Nigeria and Isfahan, Iran respectively. The High proportion of active lesions in the ages (≥ 15 years) implies higher risk, predisposing to sand fly bite due to active involvement of the socio-cultural and economic activity. Ishaya et al. [19] and Agwale et al. [23] could not observe any direct relationship with age, sex and clinical features of the cutaneous leishmaniasis lesions in Isfahan, Iran.

CONCLUSION

The prevalence of leishmaniasis in Sokoto is 46 (73%) tested positive to leishmaniasis out of 63 suspect. Based on the finding of the clinical signs of the disease and the results of the diagnostic techniques, it has been adequately proven that cutaneous leishmaniasis exist in Sokoto State in high proportion.

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