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ST. PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE

**THE ASSESSMENT OF CLINICAL CHARACTERISTICS AND
TREATMENT OUTCOMES OF LEISHMANIASIS IN ARBAMINCH
GENERAL HOSPITAL: TWO YEAR RETROSPECTIVE STUDY**

BY: DR. TEMESGEN SHEWALEM (INTERN)

ADVISORS:

DR. LINA MOHAMMED (MD, INTERNIST, NEPHROLOGY
FELLOW)

MRS. SISAY TANIE (MSC, BIOSTATISTICS)

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ACRONYMS

CL	Cutaneous leishmaniasis
DNDi	Drugs for neglected diseases
EC	Ethiopian calendar
FMOH	Federal ministry of health
G.C	Gregorian calendar
HIV	Human immune deficiency virus
KM	Kilometer
LEAP	Leishmania east African platform
rK39	A recombinant antigen derived from a 39-amino acid repeat in <i>L. chagasi</i>
VL	Visceral leishmaniasis
WHO	World health organization

ABSTRACT

Background of the study: Leishmaniasis is a parasitic disease caused by obligate intracellular protozoans of the genus *Leishmania*. The most common species of leishmania are *Leishmania donovani* and *L. infantum* or *L. chagasi*.

Statement of the problem: Leishmaniasis is very rampant infectious disease in Arbaminch hospital where it appears to have a separate ward as other major medical disciplines.

Significance of the study: The information obtained from this research will provide a tangible evidence and baseline on the prevalence and clinical spectrums of leishmaniasis on the region and management outcomes and associated factors affecting the management.

Objectives- General objectives are to assess clinical types of leishmaniasis and treatment outcomes of patients who were treated for leishmaniasis between the years 2014 and 2015 G.C in Arbaminch Hospital. Specific objectives are to assess the clinical characteristics of leishmaniasis and to assess the treatment outcomes of leishmaniasis in Arbaminch general hospital.

Research methodology

Study area- Arba Minch is a city and separate Woredas in southern Ethiopia. The study was conducted on from February to June 2017 G.C. The study is a Hospital based retrospective cross sectional study. Data was collected from hospital records from February to June 2017 G.C.

Result- All the patient records are records that are collected between 2014 and 2015 G.C. In this period, around 257 cases of leishmaniasis were seen and out these 190 were admitted with an assessment of VL, 46 of them were CL and 21 of them were MCL. 158(68.7%) were men and 72(31.3%) of them are women. 68.7% of patients are from SNNPR and 31.3% are from oromia region. all patients came from 11 zones, of which 2 (Guji and Bale) of them are from oromia and the rest are from SNNPR.

Conclusion and recommendation- All patients with visceral leishmaniasis had their follow up with subsequent splenic aspirations. Patients have proper admission and discharge history with their address. All medical complications and other diagnosis were properly documented in their charts and it was easy to track patient records. One thing I would like to recommend is that, since we mapped out hot spots of leishmaniasis in region, the regional health bureau has to assign health workers and specially trained professionals in these places. Since the disease is still there, it needs active surveillance which has to be supported and guided by federal ministry of health.

BACKGROUND

Leishmaniasis is a parasitic disease caused by obligate intracellular protozoans of the genus *Leishmania*. The most common species of *Leishmania* are *Leishmania donovani* and *L. infantum* or *L. chagasi*. The parasite is transmitted to humans and animals through the bite of an infected female phlebotomine sand fly. The parasites can also be transmitted directly from person to person through sharing of infected needles from infected individuals. There are three clinical types of leishmaniasis in mankind, namely cutaneous leishmaniasis, mucosal leishmaniasis and visceral leishmaniasis, for which there are different species of leishmania parasites are implicated. The most common form of leishmaniasis is cutaneous leishmaniasis followed by visceral and mucosal subtypes. Visceral leishmaniasis (Kala azar), is caused by species of *L. donovani* complex that consists of mainly *L. infantum*, *L. donovani*, and *L. chagasi* which are nearly always fatal if left untreated. The clinical syndrome is characterized by fever, weight loss, splenomegaly, lymphadenopathy, and hepatomegaly. Dogs are considered the major reservoir for many species of VL for human. Visceral leishmaniasis is one of the world's most neglected diseases, largely affecting the poorest people, mainly in developing countries.

The diagnosis of leishmaniasis is based on serologic, histologic, culture or molecular techniques. As for management wise, it depends on the clinical presentation of the disease. Local therapeutic approaches are management of choice in cutaneous subtypes and visceral leishmaniasis demands long term systemic therapy.

STATEMENT OF THE PROBLEM

Leishmaniasis is very rampant infectious disease in Arbaminch hospital where it appears to have a separate ward as other major medical disciplines. The ward was opened in collaboration with western interested parties to accommodate the high burden of leishmania patients flowing from konso and woito lowlands (currently segen lowlands) and other regions of gamo gofa highlands. In some parts of the region, like ochollo, 29 km away from Arbaminch town the prevalence of cutaneous leishmaniasis was almost equal to the total population, where little research and little effort was applied to hamper the progression of the disease or to educate people of the region about the disease process.

SIGNIFICANCE OF THE STUDY

The information obtained from this research will provide a tangible evidence and baseline on the prevalence and clinical spectrums of leishmaniasis on the region and management outcomes and associated factors affecting the management. The results will be submitted to involved parties and will alarm parties to control and stand against this neglected tropical disease. This research will help peoples of konso, ochollo, segen and wito lowlands by depicting clinical spectrums of the disease and presenting to responsible bodies so that they will get proper attention and action to culminate the propagation of the disease.

LITRATURE REVIEW

INTRODUCTION

GLOBAL SITUATION OF LEISHMANIASIS

Leishmaniasis is a disease caused by infection with different species of the protozoan parasite leishmania, transmitted by sandflies [1]. Leishmaniasis occurs in temperate and tropical climates in all parts of the world except in Australia and Oceania (pacific islands of Melanesia, Micronesia, Polynesia). The vast majority of cutaneous cases occur in Afghanistan, Algeria, Brazil, Peru, Iran, Syria, and Saudi Arabia [2]. An estimated 12 million people worldwide are infected, while 350 million live in areas where disease may be contracted [3]. It represents a complex of diseases with an important clinical and epidemiological diversity. Visceral leishmaniasis (VL) is of higher priority than cutaneous leishmaniasis (CL) as it is a fatal disease in the absence of treatment [1]. The number of visceral leishmaniasis cases occurring around the world is clearly far higher than officially reported, and the number of infections (4-5 times) higher still. The difficulty in estimating the case burden is due to several factors: Great fluctuations in the number of cases within short periods of time, focal distribution, numerous cases undiagnosed, as well as, misdiagnosed, not reported and often asymptomatic cases. Cases notification is compulsory in only 30 of the 88 endemic countries [4]. During the last two decades, it has become obvious that most forms of leishmaniasis are much more prevalent than had been previously suspected, both in terms of increasing incidence and geographical spread [4]. The vast majority of visceral leishmaniasis cases (90%) occur in poor rural areas of Sudan, India, Bangladesh, Nepal and Brazil [5]. Thus visceral leishmaniasis (kalazar) persists today in very poor, remote, and sometimes politically unstable areas, where health care is extremely hard to come by and there is little access to affordable drugs and preventive measures. This disease leads to substantial illness and sometimes; under conditions of extreme deprivation, the death rate can be high [6].

East African situation of leishmaniasis

The ecology of east Africa includes termite hills, acacia tree, and black cotton soil and is usually lower than 1500 meters of altitude. In some areas, people locate their villages on hill tops to avoid the sandflies, rather than living in lush, agriculturally promising river valleys where sandflies are abundant. *P. martini* is the vector in these areas. In Kenya visceral leishmaniasis is endemic in the

low lands of Karamoja on the border with Uganda, the rift valley from Kajiado through Baringo, Kitui, Muchachos and through to north eastern province [7]. In Uganda, only the Pokot are affected, their nomadic lands extend across the Kenyan border. There is also an endemic area extending on the Kenya/Sudan to Kapoeta town. In Somalia the endemic area extend from the Kenyan border, especially Bakol and Gedo [7]. In southern Ethiopia the endemic area is in Aba Roba, Segen Valley following the Segen River and near the Gelana and Dawa rivers. *P.martini* sandfly population is highest during the two rainy seasons, April-June and November-December. In Uganda phlebotomous *martini* can be found in various locations like termite hills, rodent burrows, tree holes, tukul walls which makes vector control virtually impossible [7]. Kenya, Sudan and Ethiopia form one of the major global foci of leishmaniasis in east Africa. In western Nile, southern Sudan, previous reports and conclusions of a recent WHO/UNICEF assessment mission have indicated that a severe epidemic of visceral leishmaniasis occurred during the last five years in western upper Nile and over 15000 cases have been treated there [4].

Ethiopian situation of Leishmaniasis

Leishmaniasis is an important vector-borne disease in Ethiopia and both VL and CL are endemic (Hailu and Frommel, 1993) [34]. The MoH estimates the annual burden of VL to be between 4,500 and 5,000 cases (FMoH Ethiopia, 2006). While there is currently no reliable estimate of the prevalence of CL, experts estimate that the number of CL cases significantly exceeds that of VL (Personal communication, Dr. Asrat Hailu, AAU & Dr. Abraham Aseffa, AHRI). Known VL endemic foci are in the arid south-west, and the Humera and Metema lowlands in the north-west. The definitive reservoir of VL in Ethiopia remains unknown, although transmission is assumed to be anthroponotic (WHO, 1996) [36]. CL is confined mainly to the highlands, although occasional cases have occurred in the Omo Valley, and transmission is currently thought to be zoonotic.

Visceral Leishmaniasis Epidemiology

Parasite and vector

VL in Ethiopia is caused by infection with *L. donovani*, although *L. infantum* was identified in six splenic aspirate isolates during an outbreak in Libo Kemkem, Amhara Region (Alvar et al., 2007) [9]. Both *P. orientalis* and *P. martini* have been confirmed as vectors of VL in Ethiopia, and both species breed and rest in the termite mounds common to the area. *P. celiae* is a possible auxiliary vector in Aba Roba and Weyto valley in the southwest. Although some studies propose that there is evidence of zoonotic transmission due to the presence of VL in usually

uninhabited areas or the isolation of *L. donovani* in some animal species (e.g. dogs), there is currently no conclusive evidence of zoonotic VL transmission in Ethiopia (Ayele and Ali, 1984, Ali and Ashford, 1994, Bashaye et al., 2009)[10].

Geographical distribution

Northwest

The north-western VL focus in Ethiopia covers the semi-arid Metema and Humera plains in Tigray and Amhara regional states bordering Sudan. Historically, this area reported only sporadic cases, but a marked increase occurred during the 1970s when migrants from the non-endemic highlands began to arrive in the area to harvest crops on the large-scale agricultural schemes introduced at the time (Tekle et al., 1970, Ashford et al., 1973, Fuller et al., 1976b, Mengesha and Abuhoy, 1978, Maru, 1979, Hailu and Frommel, 1993) [40],[34]. VL in the area predominantly affects young male migrant workers, who tend to sleep outdoors thereby increasing their exposure, and cases peak during the dry season from November to March (Fuller et al., 1976b, Mengesha and Abuhoy, 1978, Ritmeijer et al., 2001) [11]. PKDL is also endemic to the Metema-Humera focus, which is an extension of the endemic area in North Sudan (Zijlstra et al., 2003) [44]. Since 2003, new settlers who are being relocated from highland areas to Kafta Humera, Tsegede and Armachoworedas also constitute a new vulnerable population in the area. The relocation corresponds with a dramatic increase in VL cases recorded by Médecins Sans Frontières (MSF) in the area during 2002-2003. In 2005, an outbreak of VL in Libo Kemkem woreda, a highland area of Amhara regional state, was identified by MSF-Greece. The outbreak began in Bur kebele in 2003, with cases peaking in 2005 and occurring mainly in Libo Kemkem and Fogera woredas, ultimately becoming a low-incidence endemic area by 2007 (Alvar et al., 2007, Herrero et al., 2009) [9]. By 2007, around 2,450 primary cases and 120 deaths had been reported since the outbreak began in 2003, with the majority of cases treated at Addis Zemen health centre (Bashaye et al., 2009) [12]. Data showed that over 70% of cases occurred in males. It is likely that agricultural workers returning from Humera and Metema introduced the disease to the predominantly agricultural area (Bashaye et al., 2009, Herrero et al., 2009) [12]. These cases, and some reported in the 1970s in Belessa, an area in the Gondar region north of Libo Kemkem, are the only recorded VL cases from highland areas in Ethiopia (Ashford et al., 1973) [13]. The vector species in this area has yet to be identified. Infected dogs were identified during the survey, and

VL infection in humans was strongly associated with dog ownership, suggesting that domestic dogs may play a role in the transmission cycle in this area (Bashaye et al., 2009) [12].

Southwest

The southwest foci include the Omo plains, Aba Roba plains and Weyto River Valley in Southern Nations and Nationalities People's Region (SNNPR) – all areas of lowland savannah with low rainfall. The lower Omo plains are the oldest known VL focus in Ethiopia, first identified in the 1940s (Coles et al., 1942) [14]. Most of the population has been exposed to the disease and acquired some immunity, as indicated by a positivity rate of up to 64% using the leishmanin skin test in some tribes (Fuller et al., 1979) [11]. The majority of people in these foci are nomadic or semi-nomadic pastoralists. The other main focus in the southwest occurs in the lower course of the Rift Valley, most notably the Segen (Aba Roba focus) and Weyto valleys in the drainage basin of the Chew Bahir lake, near Konso woreda. The Aba Roba focus has a particularly high VL endemicity and high population immunity, with 36.4% testing positive with the leishmanin skin test (Ali and Ashford, 1993) [15]. The majority of cases occur in young males who have yet to develop immunity but experience high exposure to the disease (Ali and Ashford, 1994) [16]. The onset of disease in this area tends to be gradual and is characterised by enlarged lymph nodes (Lindtjorn and Olafsson, 1983) [17]. Cases in this area peak during the wet seasons, from February to May, and September to October (Gebre-Michael and Lane, 1996) [18]. Sporadic cases have also occurred further north in the middle course of the rift valley in SNNPR, with cases reported from Lake Abaya, and the Dawa and Galena valleys in Sidamo woreda (Lindtjorn, 1980, Lindtjorn, 1987, Ayele and Ali, 1984). Cases here are relatively rare, and the prevalence of skin test positives in the area is low (Berhe et al., 1998) [19]. VL has also been reported further east in the Moyale area and Genale river basin near the Kenyan border, Oromia regional state (Ayele and Ali, 1984).

Southeast

In 2001 an outbreak on the border between Kenya, Somalia and southeast Ethiopia was identified, affecting Afder and Liban zones in Ethiopia's Somali Region (Marlet et al., 2003a). The majority of cases occurred within nomadic tribes who graze their cattle over the borders. Although few previous reports of VL had been made in this area, all the Ethiopian cases occurred in children, which could indicate existing transmission (Marlet et al., 2003a) [20]. *L. donovani* was found to be the causative agent. In March 2010, some DAT

samples taken in Afder and Gode zones by MSF-H (DutchSection) from areas that previously were thought to be VL-free tested positive for VL. There is currently no estimate on the number of cases in this area, as the new cases were identified very recently.

Region	Disease foci	parasite	vector	Main outbreak, area, year
SNNPR	- Omo woreda - Lower rift valey, konso woreda, segen valey(aba roba focus),woito valley - Middle rift valeey, sidamo zone, -lake Abaya, dawa valley, gelana valley	L.donovani	Omo: p.orientalis konso: p.martini (confirmed) p. celiae (suspected)	
Oromia	- Moyale - Genale valley	L.donovani	-	
Somali	Afder&liben woreda	L.donovani	-	Border with Kenya and Somali,2001
Tigray	Humera plains	L. donovani	p.orientalis	Humera 1970, &1996
Amhara	Metema plains Libo kemkem& Fogera woreda	Libo kemkem (l.donovani, l.infantum)	p.orientalis	Metema outbreak- 1970%1996 Libo kemkem 2003-6, now endemic Belessa highland, Gondar 1972
Afar	Awash valley			

Table 1: Distribution of visceral leishmaniasis

Northeast

Cases of VL have also been recorded in the Awash Valley in Amhara and Afar regional states in the northeast, which also experienced expanding agricultural development and an influx of migrant workers during the 1970s (Fuller et al., 1976a).

Risk factors

Various risk factors have been associated with VL transmission in Ethiopia. The majority of VL cases throughout the country occur in males, a pattern caused by increased exposure to the sandfly vector during agricultural or pastoral work. The age groups affected tend to reflect exposure, and the length of time VL has been present in the area. In areas where the disease has

been endemic for many years, more cases occur in younger age groups as they have yet to develop the acquired immunity seen in adults. In outbreaks or areas where the disease has recently been introduced, all ages are susceptible, and most cases occur in groups that have regular contact with sandfly habitats (Ali and Ashford, 1994). VL transmission also seems to be associated with humidity, as measured by the amount of rainfall, although no universal pattern has been established (Gebre-Michael and Lane, 1996). For example, in the southwest foci, the greatest risk of infection is likely to occur in the rainy season, during which the vector population increases and the human population is more exposed to sandfly biting due to intensified farming and grazing activities (Ayele and Ali, 1984). In the northwest, however, cases peak just after the rainy season when the majority of migrant workers leave the highlands to work on lowland farms during the harvest. These workers also sleep outdoors, thereby increasing their exposure to the vector. The high rate of HIV infection in this migrant population has an impact on treatment outcomes. The case fatality rate for VL patients in an MSF-supported control programme in Tigray was much higher compared to areas with lower rates of HIV. HIV positive cases were four times more likely to die than those who were not (Lyons et al., 2003) [21]. A recent study investigating risk factors associated with the outbreak in Libo Kemkem identified dog ownership and habitual outdoor-sleeping to be risk factors for infection (Bashaye et al., 2009). The study also found that keeping cattle indoors, lack of mosquito net ownership and un-plastered walls were also associated with increased VL risk. The Armauer Hansen Research Institute (AHRI) is currently in the final year of a three-year risk factor assessment in Libo Kemkem, which focuses on the interaction of malnutrition and immunology (Personal communication, Dr. Abraham Aseffa, AHRI). Other studies in Ethiopia have found additional factors such as proximity to termite hills and poor nutritional status to be associated with increased VL risk (Ali, 1997a, Ali, 1997b).

Cutaneous Leishmaniasis Epidemiology

CL was first described in Ethiopia in 1913 and is common in highland areas between 1,400 to 2,700 m (Balzer et al., 1960, Ashford et al., 1973, Hailu and Frommel, 1993) [22]. The majority of CL in Ethiopia is caused by *L. aethiopica*, (Lemma et al., 1969, Ashford et al., 1973, Lindtjorn, 1981) [23] with rare cases caused by *L. major* and *L. tropica* (Fuller et al., 1979). CL due to *L. aethiopica* manifests itself in three forms, all of which are found in Ethiopia: localised cutaneous (LCL), ML and diffused cutaneous leishmaniasis (DCL) (Ashford et al., 1973, Gebre-Michael et al., 2004). Infection is largely transmitted by *P. longipes*, although *P. pedifer* is also known to

transmit the infections. CL transmission in Ethiopia is zoonotic, with the rock hyrax acting as the main reservoir (Ashford et al., 1973). CL has been extensively studied in the western highlands and lake areas of the Rift Valley. The main areas of transmission include the Ochollo focus in the Rift Valley escarpment above Lake Abaya, the Kutaber area in the eastern Ethiopian plateau near Dessie, the Aleku area of Wollega zone, the south-west highlands of Bale and Sidamo, and the Sebeta area near Addis Ababa. The Ochollo focus is highly endemic for the disease, with higher prevalence in younger age groups. An outbreak in Silti woreda, SNNPR, 150km south of Addis Ababa, was reported in 2005. A CL prevalence of 4.8% was recorded, which exceeded prevalence rates previously reported from Ochollo (Ashford et al., 1973, Negera et al., 2008) [24]. Unlike endemic areas such as Ochollo, where prevalence is highest in children aged 0-10 years, the majority of cases in the Silti outbreak occurred in those aged 11-20 years. This indicates a difference in immunity in the two areas, with adults in high prevalence areas demonstrating protective immunity, suggesting that the disease has only been recently introduced to Silti woreda.

Table 2: distribution of cutaneous leishmaniasis

Region	Disease foci	Parasite	Vector	Main out breaks
SNNPR	Ochollo village, sidama zone, silti woreda	L. aetiopica L. major l. tropica	p. longipes p. pedifer	Ochollo highly endemic Silti woreda 2005 outbreak with prevalence of 4.8%, majority in 11-20yrs
Oromia	Wollega(aleku area) Bale	L. aetiopica	L. aetiopica	
Amhara	Kutaber woreda	L. aetiopica	L. aetiopica	

Leishmaniasis Control – Prevention, Diagnosis and Treatment

Leishmaniasis in Ethiopia was formerly overseen by the MoH's Communicable Disease Department, but after the MoH underwent a large reorganisation in 2007, responsibility for leishmaniasis has been decentralized. The MoH is now organized into three directorates, including the Directorate for Health Promotion and Disease Prevention,

which covers most communicable disease including NTDs. The directorate is organized in urban, agrarian, and pastoralist sub-directorates, each responsible for a set of regional states. Health officers are assigned to the regional state to manage overall health promotion and disease prevention, and thus oversee all diseases, instead of having disease-specific duties. However, there is also a group of MoH staff working specifically on NTDs in collaboration with WHO and other partners to finalize a strategic plan for integrated NTD control. The group is currently chaired by Dr. Tizita Hailu (Personal communication, Hunegnaw Mekonnen, MoH). A National Leishmaniasis Task Force was established in 2007 with the aim of eliminating VL by 2015. The task force includes members from the Institute of Pathobiology at Addis Ababa University; the Drugs for Neglected Diseases Initiative (DNDi); MSF-H; International Training and Education Centre for Health (ITECH); WHO; MoH HIV/AIDS Prevention and Control Office (HAPCO); AHRI; Ethiopian Health and Nutrition Research Institute (EHNRI); Spanish Agency for International Cooperation for Development (AECID); and affected regional offices.

Hospitals and health centres in endemic regions equipped to treat VL include: Humera Hospital, Axum Hospital and Makelle Hospital in Tigray regional state, Gondar University Hospital, Metema Hospital, Bahir Dar Hospital and Abderafi health centre in Amhara regional state, Arba Minch Hospital in SNNPR, and Tikur Anbessa Hospital in Addis Ababa.

Surveillance

At present there is no standardised national reporting system for leishmaniasis in Ethiopia, but a HMIS for the collection of national health statistics has recently been introduced by the MoH and includes leishmaniasis in its surveillance categories. However, there are still no available data on number of cases nationally or by regional state. WHO, along with the MoH and other partners have developed a standardised reporting format for VL for use between the districts and regional states, which is pending endorsement from the task force. Except for Amhara regional state, leishmaniasis is not included in the IDSR Strategy (Personal communication, Merce Herrero & Abate Mulugeta, WHO). WHO are collaborating with the MoH to map the geographic distribution of VL nationwide, funded by the Spanish Government. The first phase includes mapping the disease in Amhara, Tigray, Oromia and Somali regional states, and the second phase will include expansion into SNNPR, Afar,

Gambella and Benishangul Gumuz regional states. This mapping exercise will assess VL distribution through leishmanin skin tests, serology, active case finding and community based surveys, investigate the presence of animal reservoirs, and conduct entomological studies. Much less is known about the distribution and burden of CL in Ethiopia. AHRI began a GPS mapping project in 2009 to identify areas of Ethiopia where CL is currently present. A team of clinicians, laboratory technicians, and geographic information system (GIS) experts are sent to locations where CL had been reported to confirm its presence and to inquire about other endemic areas. This mapping project is ongoing and no results have been released to date (Personal communication, Abraham Aseffa, AHRI).

HIV and leishmaniasis

Studies in many parts of the world show that, leishmaniasis is widening especially in the advent of HIV/ AIDS its horizon and new territories of the disease are being discovered as time passes by [25]. Some authorities rank visceral leishmaniasis, as the forth most common opportunistic parasitic disease in HIV positive individuals in at least in the south Western Europe, just following pneumocytosis, Toxoplasmosis and cryptosporidiosis. AIDS with visceral leishmaniasis has shorter survival time than AIDS with other illnesses. Although leishmaniasis has been recognized as health problem for almost a century, its public health impact appeared to have been very amplified owing to its intimate association with HIV/AIDS, which became evident only two decades ago. The overall national prevalence of HIV in Ethiopia is known to be 2.1%. Leishmania / HIV co-infections can lead to epidemiologic changes of visceral leishmaniasis. Co-infected patients harbor a high number of leishmania in their blood so there is a risk of them becoming reservoirs of the disease that in turn may increase the risk of future epidemics especially in countries of anthroponotic foci. Post-kala-azar dermal leishmaniasis, associated with incomplete treatment, becomes another factor for increased transmission through reservoir amplification. Up to 50% of HIV positive VL cases could relapse at some point. The simultaneous co-existence of these two immuno-compromising infections make patients present atypically, pose difficulties to be detected by routine diagnostic tests, most often result in an unfavorable response to treatment, frequent relapses and in premature deaths nevertheless, the introduction of highly active anti-retroviral therapy (HAART) as a standard treatment for HIV has resulted in a significant decrease in the incidence of VL in HIV-infected individuals in southern Europe.

Diagnosis

The national guidelines recommend clinical diagnosis and use of rK39 RDTs at health centres, with treatment of positive cases occurring on site. Clinical cases that are negative with the rK39 RDT are referred for further diagnosis using DAT and/or lymph node or bone marrow aspirate at district or zonal hospitals. Diagnosis using splenic aspirate is only recommended at zonal or specialised referral hospitals. Despite these guidelines, there seem to be few staff adequately trained to conduct such procedures in government-run facilities. RDTs used at MoH facilities are provided by WHO or MSF-H. MSF-H diagnoses clinically suspected cases with rK39 RDT at outreach health centres, and refers cases for confirmation or treatment to its treatment centres. Cases with negative rK39 RDT results are referred to facilities fully supported by MSF-H for further diagnosis by DAT or splenic/lymph node aspirate if DAT is negative. Lymph node aspirates are conducted at the two centres currently supported by MSF-H, but splenic aspirates are only conducted at Kahsay Abera General Hospital in Humera, Tigray Region. A number of studies have been conducted on the accuracy of diagnostic methods for VL in Ethiopia. The rK39 RDT has been reported to have a sensitivity of 71.7% (Diro et al., 2007) [27], which is lower than DAT with a sensitivity as high as 97.7% (Hailu and Berhe, 2002). This high sensitivity is also retained when DAT is used to diagnose VL in HIV co-infected patients (Hailu and Berhe, 2002). However, the specificity of the rK39 RDT appears to be higher than DAT, at 82.4% compared to 62.7% specificity, respectively (Diro et al., 2007). In 2009, MSF-H published results from a study conducted in 2006-2007 in Humera investigating the accuracy of the rK39 RDT. Sensitivity of the rK39 RDT was found to be 84%, which was lower than that found for DAT (94%). However, specificity of the rK39 RDT was higher than that of DAT, at 99%, compared to 92%, respectively. Sensitivity was also disaggregated by HIV-positive and HIV-negative patients, as Humera has a high prevalence of HIV. For both the rK39 RDT and DAT, sensitivity in HIV patients was significantly lower than that of the overall study sample, at 77% and 89%, respectively (ter Horst et al., 2009). AHRI has developed a simplified molecular diagnostic test for CL, in particular for infection with *L. aethiopica*. Past diagnostic methods such as electrophoresis are labour- intensive and slow, and the molecular differentiation between *L. aethiopica* and *L. tropica* has been difficult. The newly developed diagnostic test allows for immediate genotyping of the infection, which is particularly useful for outreach teams. The epidemiology of CL and its response to treatment vary according to infecting parasite species, therefore species-specific treatment is recommended. The

results have been submitted for publication, and field tests for the diagnostic test are being planned (Personal communication, Abraham Aseffa, AHRI).

Treatment

Drugs registered for VL by the Drug Administration and Control Authority (DACA) in Ethiopia are pentamidine, SSG and amphotericin B. AmBisome has been approved by the National Drug Advisory Committee and included on the National Drug List (NDL). Steps are also being taken to register Miltefosine, and Sanofi Aventis are in the process of submitting Glucantime for registration in Ethiopia, Kenya and Sudan. DNDi have recommended that all available drugs for leishmaniasis treatment are included in the NDL and in the national guidelines. The government guidelines recommend SSG as the first line treatment for VL, and amphotericin B as second line treatment to be used in cases of toxicity, relapse and treatment failure. Amphotericin B is also recommended as a first line treatment for pregnant women. However, due to the high toxicity resulting from the use of amphotericin B, AmBisome® is preferable despite its high cost. The guidelines also include recommendations for treatment of VL co-infection with malaria or HIV, relapses, PKDL, and evaluating cures. WHO provide SSG and AmBisome® to government-run facilities in VL endemic areas. HAPCO, the government office that manages HIV/AIDS in Ethiopia, plans to provide SSG and AmBisome® to HIV/VL co-infected patients. MSF-H uses SSG as a first line treatment for VL, and use AmBisome® for HIV positive cases, relapse or treatment failures. The organisation provides these drugs to Humera and Axum hospitals in Tigray regional state, and Abderafi health centre in Amhara regional state. In 2006, DNDi opened the Leishmaniasis Research and Treatment Centre (LRTC) within Arba Hospital, Arba Minch, SNNPR. LRTC is Africa's first research facility focusing on VL and is part of the DNDi supported LEAP, implemented in collaboration with the MoH, Addis Ababa University (AAU) and DACA. A trial testing a 17-day short-course of SSG/paromomycin combination therapy, compared to each drug used alone, finished in January 2010 with results to be reported later in 2010. A Miltefosine/AmBisome combination trial planned for Sudan and Kenya will be expanded to Ethiopia in 2010, and, if successful, provide further support for the registration of Miltefosine. A trial to determine the lowest, safe, single dose of AmBisome commenced in Arba Minch and Gondar Hospitals in 2009, scheduled to be completed in June 2011. A study investigating the effectiveness of pentamidine as a secondary prophylaxis in HIV co-infected patients, led by the Institute of Tropical Medicine (ITM) in Belgium in collaboration with AAU, Gondar University,

DNDi, and MSF-H, is currently under ethics committee review (Personal communication, Endeshaw Mengistu, MSF-H & Asrat Hailu, AAU). EHNRI has conducted a pilot study on the efficacy of plants used by traditional healers to treat leishmaniasis, and obtained potentially promising results. The institute is now embarking on a more thorough research project to screen the active ingredients of about five to seven of these plants in the laboratory, to more conclusively determine their benefits. EHNRI estimates that up to 85% of the population in Ethiopia rely on traditional healers in some way, and therefore research into treatments provided through these providers is considered important (Personal communication, Amha Kebede & Geremew Tasew, EHNRI). Currently there are no standard guidelines for the treatment of CL in Ethiopia. AHRI presently prefers to treat with cryotherapy, a topical treatment consisting of repeated sessions of applying liquid nitrogen to lesions, instead of the available drugs, which are potentially toxic. AHRI has been in discussions with WHO to initiate a clinical trial to test the efficacy of various available treatments for CL, particularly for CL due to *L. aethiopica* (Personal communication, Abraham Aseffa, AHRI).

Prevention

There are limited data on the use and effectiveness of ITNs in the control of VL in Ethiopia, although during the Libo Kemkem outbreak it was noted that ITN possession was associated with a decreased likelihood of becoming infected.

Implementing Partners

Due to the lack of government resources for VL control in Ethiopia, the support of various organisations is required to sustain surveillance, diagnosis, treatment and training, including MSF-H, WHO, DNDi, and AECID. MSF-H has been able to hand over some of its programmes to the MoH in recent years. Until January 2009, MSF-H provided full support for VL control to Humera Hospital (target population: 150,000), including staff, laboratory technicians, diagnosis, treatment and active outreach and case finding. In January, the hospital was handed over to the Tigray Regional Health Bureau although MSF continued to provide some support until June 2009. Axum Hospital, also in Humera, was also formerly supported by MSF H, but had since been handed over to the government (Personal communication, Julius Olenge, MSF-H). WHO is involved in procurement of drugs and diagnostics for VL, monitoring and evaluation, disease mapping, training of MoH staff, and capacity building at the federal level. WHO also works with ITECH in a programme funded by the AECID to standardize training materials, and develop a training

manual aimed at clinicians, nurses and lab- technicians for VL diagnosis and treatment, and conduct training on the manual in VL endemic areas. CL is currently mainly being treated at AAU, Gondar Hospital, and ALERT hospital (AHRI). AHRI staff also travel about once a week to Silti woreda to provide care, as they had been conducting research on CL in Silti and the local facilities are not yet equipped to manage CL cases (Personal communication, Asrat Hailu, AAU & Abraham Aseffa, AHRI).

Leishmaniasis treatment outcome studies

There many researches done regarding clinical characteristics and treatment outcomes of leishmaniasis in different countries and in our country as well, especially in northwestern Ethiopia. However, most of these researches were concerned only with visceral leishmaniasis and others are regarding the association between HIV and leishmaniasis.

On one study done at Gondar, From January 1999 to July 2004, there were 8,049 admissions and 1,334 deaths within the medical wards of Gondar University Hospital. Of these, 221 were visceral leishmaniasis cases, accounting for about 2.8% of the admissions and 52(3.9%) deaths in the medical wards. The male to female ratio was 19:1 and the mean age was 25.7 ± 7.8 years (range 14-55 years). Two hundred and six (93.2%) of the cases were under 40 years of age and 119(53.8%) were in the 20-29 age group, followed by 44(19.9%) in the 10-19 age group. Of 212(95.9%) VL patients who agreed to HIV testing, 87(41.0%) were HIV positive. Of those with both infections, 85(42.3%) were males. HIV co-infection was found in 65.5% (83/58) of those older than 29 years. All visceral leishmaniasis patients complained of a history of generalized body weakness. Similarly, all cases had a history of fever with a mean duration and temperature of 12.6 ± 8.9 weeks and $38.0^\circ\text{C} \pm 1.0^\circ\text{C}$, respectively. Splenomegaly was found in all patients with a mean size of 10.4 ± 4.5 cm, below the constal margin along the left midclavicular line. Hepatomegaly was seen in 104(47.1%) patients, with a mean total liver span at right midclavicular line of 14.4 ± 1.5 cm. A history of weight loss over a mean duration of 13.4 ± 10.1 weeks and a mean body mass index of 15.5 Kg/sq.m was observed in 218(98.6%) patients, despite the good appetite reported by 60(27.3%) patients. About 195(88.2%) had signs of anemia (pallor), with a mean hematocrit of $22.1 \pm 6.6\%$. History of bleeding tendency from any site was found in 119(53.8%) cases; the most common was epistaxis (76.4% of cases), followed by gum and gastrointestinal tract bleeding in different combinations. The least common clinical findings were coughing (32.6%), gray to dark skin color change (24.4%), diarrhea (21.7%), lymphadenopathy (19.9%) and jaundice (6.3%).

Sodium stibogluconate was given to 213(96.5%) visceral leishmaniasis patients. Eight patients (3.6%) were referred to other centers after diagnosis and stabilization, as the drug was not available in the hospital. From the treated cases, 157(73.7%) were declared clinically cured, 52(24.4%) died in the hospital and four reported back with relapse. All the relapse cases were HIV positive. The case fatality rate among HIV co-infected patients was 39.3%, whereas it was 13.3% in HIV negatives patients (OR=2.1, CI=2.108.3).

In another study done at Kahsay Abera hospital, humera, The majority of patients (133, 89.3% HIV negative and 53, 57.6% HIV positive) were treated with pentavalent antimony. The case fatality rate was higher in HIV-positive patients with VL than in HIV-negative patients with VL treated with pentavalent antimony (24.5% vs. 3.8%, respectively, $P < 0.001$).

In one study done at Kacheliba health center and Amudat hospital found Pokot region in Uganda and Kenya border from 2000 GC to 2010 GC, clinical presentations were all patients had fever, weight loss(87.8%), loss of appetite(86.8%), spleen enlargement(77.1%), nose bleeding(21.9%), vomiting(16.5%) headache(14.6%), abdominal swelling(11.4%), abdominal pain(13.0% and diarrhea(8.5%). 45.8% had signs of anemia, 24.7% had severe acute malnutrition and 27.6% had moderate malnutrition. Concomitant HIV infection was 2.3% and other 3.8% to 34.4% had concomitant malaria. Over all case fatality of VL was 1% in Kacheliba and 3% in Amudat hospital. However, active follow up was not implemented resulting in low follow up rates which was 16.7% in Kacheliba and 3% in Amudat.

In study done on epidemiology and clinical features of patients with visceral leishmaniasis Bakool region, Somalia 2004-2006 GC, overall case fatality rate was 3.9% and clinical recovery rate was 93.2%.

OBJECTIVES

GENERAL OBJECTIVES

- I. To assess clinical types of leishmaniasis and treatment outcomes of patients who were treated for leishmaniasis between the years 2014 and 2015 G.C in Arbaminch Hospital, Arbaminch

SPECIFIC OBJECTIVES

- i. To assess clinical characteristics of leishmaniasis in arbaminch general hospital
- ii. To assess the treatment outcomes of leishmaniasis in arbaminch general hospital, between 2014 and 2015 G.C.

METHODS AND MATERIALS

STUDY AREA

Arba Minch (Amharic: ላላ ላላ, "forty springs") is a city and separate woreda in southern Ethiopia; the first common name for this city was **Ganta Garo**. Located in the Gamo Gofa Zone of the Southern Nations, Nationalities, and Peoples Region about 500 kilometers south of Addis Ababa, at an elevation of 1285 meters above sea level. It is the largest town in Gamo Gofa Zone and the second town in SNNPR next to Awassa. It is surrounded by Arba Minch Zuria woreda.

Arba Minch received its name for the abundant local springs which produce a groundwater forest. Located at the base of the western side of the Great Rift Valley, Arba Minch consists of the uptown administrative centre of Shecha and 4 kilometers away the downtown commercial and residential areas of Sikela, which are connected by a paved road. On the eastern side of Sikela is the gate to Nechisar National Park, which covers the isthmus between Lake Abaya to the north and Lake Chamo to the south. Buses and taxis connect the uptown and downtown parts; both parts have schools. Kulfo River flows through the town, and drains into Lake Chamo.

Arba Minch is known as a source for fruit, including mango, banana, orange, apple, guava and pineapple, and is also known for its fish farms.

Based on the 2007 Census conducted by the CSA, this town has a total population of 74,879 (currently app. 280,000), of whom 39,208 are men and 35,671 women. The majority of the inhabitants practiced Ethiopian Orthodox Christianity, with 56.04% of the population reporting that belief, 38.47% were Protestants, and 4.16% were Muslim. In the same year, around the town of Arba Minch, in the Arba Minch District, there were 164,529 people, of whom 82,199 were male and 82,330 were female. In this district, 53.9% practiced Protestantism, 29.3% practiced Ethiopian Orthodox Christianity, 12.6% practiced Traditional beliefs, and all other religious practices made up 4.1%. The study was conducted at Arbaminch hospital, which is found at the heart of the city, between the up and downtowns. It is part of Arba Minch University and became medical school starting from the past 8 years. It has five separate wards and many other specialty units. Leishmaniasis is a separate disease, where it appears to have a separate ward which has been opened many years back with the aim of having center of research and leishmania eradication

program from endemic areas like konso, woito and segen people. The study was conducted from February to June 2017 G.C.

STUDY DESIGN

The study is a Hospital based retrospective descriptive cross sectional study

STUDY POPULATION

The study populations of this study were patients who have attended Arbaminch hospital from the time January 2014 to December 2015 G.C and study units were all patients who are diagnosed to have leishmaniasis using clinical methods or laboratory assays and started treatment for leishmaniasis in the same mentioned time period.

INCLUSION AND EXCLUSION CRITERIA

- INCLUSION CRITERIA

1. Patients diagnosed to have any form of leishmaniasis
2. Patients presented to the hospital from January 2014 to December 2015 G.C.

- EXCLUSION CRITERIA

1. Patients with other confirmed diagnosis and leishmaniasis ruled out
2. patients with deficient medical records

SAMPLE SIZE AND SAMPLING TECHNIQUES

All patients diagnosed to have any clinical type of leishmaniasis in the given study period were selected irrespective of their number.

DATA COLLECTION

Data collection was carried out from February to May 2017 G.C by seven adequately trained runners, two supervisors and five data collectors. Patient record reviews included all patients diagnosed to have leishmaniasis, clinical types, and mode of diagnosis, physical findings, treatment regimens and management outcomes.

DATA ANALYSIS

Data was checked for completeness, coded, entered, coded, entered and cleaned manually and analyzed using SPSS 20.0 version. The descriptive statistics using frequency distribution was done for sociodemographic characteristics and clinical characteristics of the study participants.

STUDY VARIABLES

Main variables of this study include Age, Sex, Ethnicity, Sociodemographic conditions, Presence of health facility in the vicinity, Religion, Hospital chart keeping, Adherence of patients to their medications, Clinical Presentation of the patients, Duration of the illness before hospital, Regimen of management chosen and patient response to treatment

ETHICAL CONSIDERATION

Ethical clearance was initially obtained from Saint Paul's hospital millennium medical college Ethical committee. Written consent was then secured from regional health Bureau, zonal health office. Further written consent was obtained from respective bodies of Arbaminch general hospital. Data collectors and other concerned bodies were informed about the research and informed problems regarding data collection and the problems were solved through peaceful discussion with respective bodies.

RESULTS

This study was done at Arbaminch General Hospital, where there was an organized leishmania center funded by LEAP (leishmaniasis east African platform) and DNDi (drugs for neglected diseases), organizations striving to eradicate the disease from east Africa, have been doing researches for decade. Patient records are well documented using well prepared tables. For this study, relevant data was collected from 230 fully documented patient records. All the patient records are records that are collected between 2014 and 2015 G.C. In this period, around 257 cases of leishmaniasis were seen and out these 190 were admitted with an assessment of visceral leishmaniasis, 46 of them were cutaneous leishmaniasis and 21 of them were mucocutaneous leishmaniasis. Unfortunately, 27 patient records were lost and data was collected from 230 patient records

Socio demographic characteristics of leishmaniasis

Out of 230 patient records, 158(68.7%) were men and 72(31.3%) of them are women. The earliest age at presentation is 3 months and the oldest is 68yrs the mean being 15.94years (standard deviation 12.66). The following table illustrates age distribution of leishmaniasis among the study population. As we can see from the table more than 80% of the patients are less than 20years old.

Table 3: sex of patients

Sex	Frequency	Percent
Male	158	68.7
Female	72	31.3%

Table 4: Age distribution of patients

Age group	Frequency	Percent
1-10	91	39.6
11-20	95	41.3
21-30	23	10.0
31-40	12	5.2
41-50	2	.9

50-60	5	2.2
60-70	2	.9
Total	230	100.0

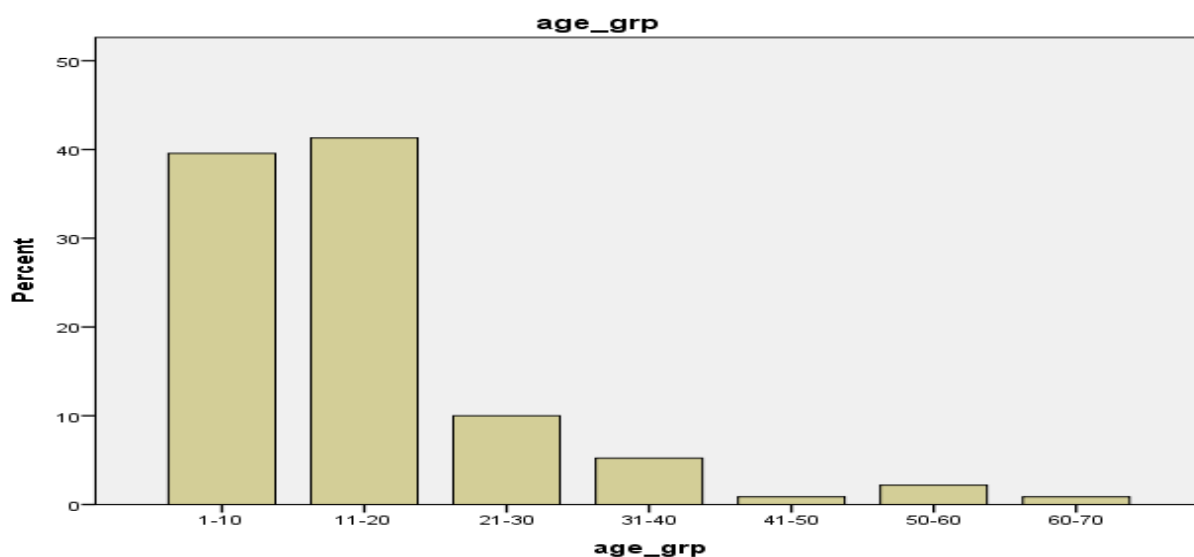


Figure 1: Age distribution of patients

Religion of the study population was heterogeneous. The majority of the patients were Christians (in different forms) 57.9% and Muslim and local religions also contribute to major portion of religion distribution, Muslim being 25.2% and local religions constitute 17.0% of the study population.

Table 5: Religion of patients

Religion	Frequency	Percent
Christian	133	57.8
Muslim	58	25.2
Local	39	17.0
Total	230	99.1

Since Arbaminch is geographically near to southern Oromia zones (which are found in the eastern shores of Lake Abaya and Lake chamo) and other southern parts of the nation, the proportion of

patients from both oromia and SNNPR regions were proportional. 68.7% of patients are from SNNPR and 31.3% are from oromia region. Zone wise speaking, all patients came from 11 zones, of which 2 (Guji and Bale) of them are from oromia and the rest are from SNNPR. Specific clinical diagnoses are associated with the location the patient. Almost all patients from guji zone, segen zone and south omo are visceral leishmaniasis and patients from gamogofa incorporate most cases of cutaneous and mucocutaneous leishmaniasis. When we break the epidemiology in woredas, leishmaniasis still occurs in 29 woredas, most of which are SNNPR woredas. Out of these woredas, liben (oromia), konso, hamer and Gordola constitute most cases of visceral leishmaniasis, whereas, woredas like boreda, chench, Arbaminch zuria woreda, dita and kucha are woredas with most cases of cutaneous and mucocutaneous leishmaniasis. The following table illustrates 11 zones and 29 woredas with high burden of leishmaniasis.

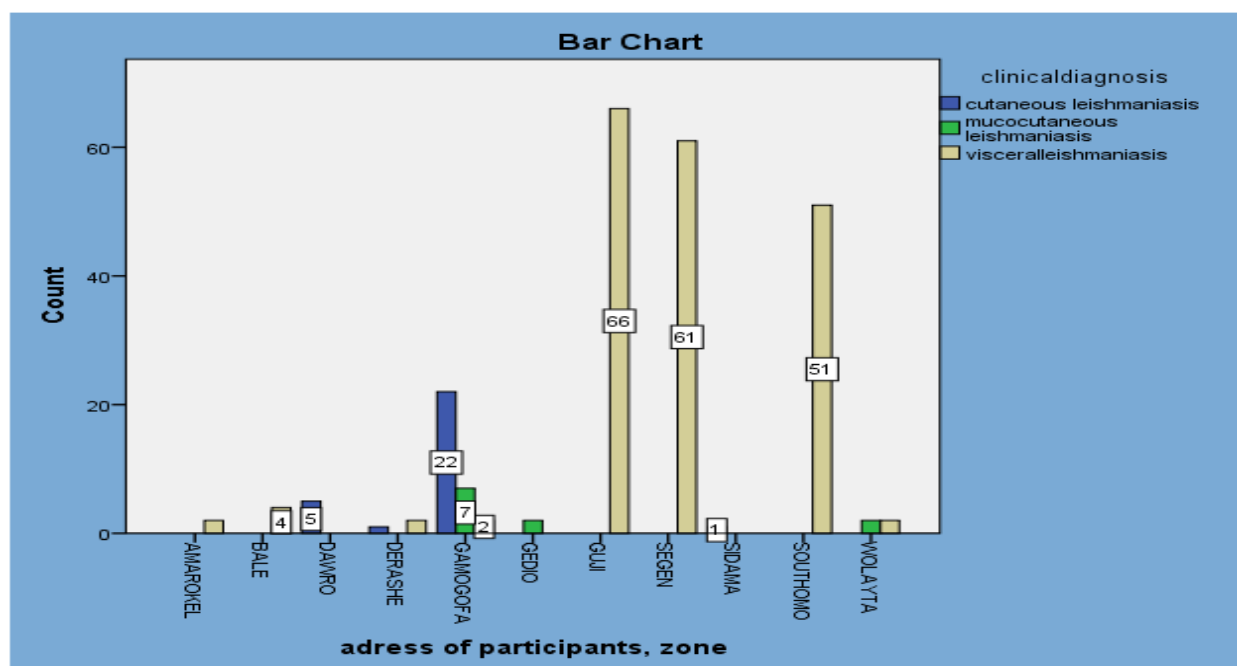


Figure 2: address of participants

Table 6: Zones and Woredas with burden of leishmaniasis

Zones	Woredas with burden of leishmaniasis		
Guji (64)	A/minch zuria(8)	Gessa(1)	Liben (52)
Bale (4)	Bonke(1)	Gidole(1)	Lomegessa(1)
Dawro (5)	Boreda(7)	Gordola (10)	Mareka (1)

Wolayta (4)	Bule (2)	Gulgula (2)	Medawolabu(4)
Gamogofa (31)	Chencha(7)	Hamer (37)	Nyngatom(12)
Southomo(53)	Derashe (1)	Kalada (2)	Semenari(1)
Segen peoples zone(61)	Dimeka(4)	Kindo koysha(2)	Shelit (1)
Amaro kele (2)	Dita(4)	Konso(61)	Yabelo (2)
Gedio (2)	Gato(1)	Kucha (3)	Yirgalem (1)
Sidama (1)		Lageno (1)	
Derashe(3)			

CLINICAL PRESENTATIONS

It is very difficult to get clinical presentation of patients on admission from patient records. Here in this case was easy to find initial presentations of patients from properly tabulated patient records.

Fever

Fever is the most common presentation of patients with leishmaniasis. Overall 83.5% of patients initially presented with fever. It occurred in 3.4% patients with cutaneous leishmaniasis, 9.1% of mucocutaneous leishmaniasis and 100% of patients with visceral leishmaniasis.

Table 7: prevalence of fever

		Clinical diagnosis			Total
		cutaneous leishmaniasis	mucocutaneous leishmaniasis	Visceral leishmaniasis	
Fever	Yes	1	1	190	192
	No	28	10	0	38
Total		29	11	190	230

Headache

Headache occurred in 82.6% of patients. Of these, it occurred in 100% with visceral leishmaniasis but did not occur in any patient with cutaneous or mucocutaneous leishmaniasis.

Itching, skin lesions and mucosal lesions

Both itching and skin lesions occurred in all patients (100%) with cutaneous and mucocutaneous leishmaniasis. Moreover, skin lesions occurred in 1.05% of patients with visceral leishmaniasis. Mucosal lesions occurred in 6.52% of all patients. It occurred in all patients with mucocutaneous leishmaniasis and 2.1% of patients with visceral leishmaniasis

Weight loss and abdominal swelling

Weight loss and abdominal swelling occurred in 82.2% and 82.6% respectively, at initial presentation. Out of these, it occurred in 100% of patients with visceral leishmaniasis but did not occur in any patient with cutaneous or mucocutaneous leishmaniasis.

Night sweating, malaise and easy fatigability

Night sweating and easy fatigability both occurred in 82.6% of patients and all of these were patients with visceral leishmaniasis. Malaise occurred in 83.5% of patients, 100% in visceral leishmaniasis and 18.1% of patients with mucosal leishmaniasis

Epistaxis

Overall epistaxis occurred in 18.7% of patients and 22.6% of patients with visceral leishmaniasis. All the cases of epistaxis have occurred in visceral leishmaniasis.

Prior history of leishmaniasis treatment

There were 257 cases of leishmaniasis seen in the hospital between 2014-2015GC and 230 patient records were found and there was no patient with prior history of leishmaniasis treatment in way or another.

Clinical diagnosis

After presenting with the above mentioned symptoms, all the patients were diagnosed and treated with their specific management. Visceral leishmaniasis was the most commonly diagnosed type of leishmaniasis and cutaneous and mucocutaneous leishmaniasis follow. There was no case of post kalaazar dermal leishmaniasis in the respective period. The following table shows the frequency and type of leishmaniasis.

Table 8: Clinical diagnosis

Diagnosis	Frequency	Percent
Cutaneous leishmaniasis	29	12.6
Mucocutaneous leishmaniasis	11	4.8
Visceral leishmaniasis	190	82.6
Total	230	100.0

ASSOCIATED DIAGNOSES

Apart from leishmaniasis, other patients had other associated diagnoses at presentation and during their course in the hospital. From this survey it was found that all these diagnoses were made in patients with visceral leishmaniasis. All patients with visceral leishmaniasis had anemia in some form (mild, moderate or severe). 6.5% of patients with visceral leishmaniasis have SAM and of these 37% is in patients who are <5 years old. The following frequency table depicts frequency of associated diagnosis in patients with leishmaniasis.

Table 9: Associated diagnosis

Associated diagnosis	Frequency	Percent
SAM	13	5.7%
Anemia	190	82.6%
HIV/AIDS	2	0.86%
Malaria	4	1.7%
Tuberculosis	2	0.86%

Treatment

Arbaminch hospitals working guideline uses Sodium stibogluconate (SSB) as first line treatment for all types of human leishmaniasis. According to the working guideline, paromomycine will be added for mucosal leishmaniasis and amphotericin is given for first line treatment failure. The following frequency table shows the frequency and percent of patients treated with each regimen.

Table 10: Treatment regimen

Regimen	Frequency	Percent
SSB	215	93.4%
SSB + paromomycin	13	5.7%
Miltefocine	0	0%
Amphotericin	2	0.9%

Treatment outcomes

The following table shows various treatment outcomes of patients treated with leishmaniasis

Table 11: Treatment outcomes

Outcome	<i>Frequency</i>	Percent
Improved	221	96.1%
Complications	10	4.3%
Death	9	3.9%
Total	230	100%

Most of the patients were discharged with improvement, these constitute around 96.1% of the study population. Complications occurred in 4.3% of patients and of these 3.9% of these died. 0.9% had treatment failure and changed to amphotericin regimen and eventually died. DIC occurred in 0.9% of all patients/ there was no disfigurement of the nose or the lip as a complication of mucocutaneous leishmaniasis. All improved patients have long term outpatient follow up at Arbaminch general hospital.

DISCUSSION

The main aim of this research was to evaluate clinical parameters and treatment outcomes of patients treated for leishmaniasis. In the meantime, this research has addressed and mapped out epidemiologically important areas of leishmaniasis. From this research, it is found that 39% of patients were below the age of 10 and 80.3% were under the age of 20 and 94.6% were below 30 years of age. It was comparable to the findings from researches done in Gondar where the mean age was 25.7 ± 7.8 years (range 14-55 years). Two hundred and six (93.2%) of the cases were under 40 years of age and 119(53.8%) were in the 20-29 age group, followed by 44(19.9%) in the 10-19 age group.

Speaking of epidemiology of the disease in terms of regions, zone and Woredas, south nation's nationalities and peoples region has the most burden of the disease. It constitutes 68.7% of patients in the hospital and Oromia region takes the other 31.3% of disease burden. Two zones from Oromia region are inflicted with leishmaniasis (Bale and Guji) and nine zones from SNNPR were affected namely Amaro kele, derashe, dawro, gamogofa, gedio, sidama, wolayta, segen peoples zone, south omo zone. The clinical presentation varies from zone to zone as well as woreda to Woredas. Visceral leishmaniasis is rampant in guji, segen peoples and South omo zones. There were few cases of visceral leishmaniasis from Amaro kele, bale, derashe and wolaita zones each having two cases over two years. So this needs further evaluation whether the patients had travel history or if the disease prevails there. Gomo gofa, dawro, derashe, gedio and sidama zones constitute all cases of cutaneous and mucosal leishmaniasis and gamogofa zone accounts for 75% of both cutaneous and mucocutaneous leishmaniasis. Furthermore, the disease occurs in 29 distinct Woredas in both regions.

The disease has various clinical presentations and fever was the most common clinical presentation, 83.5% of all patients and 100% of patients with visceral leishmaniasis had fever which was similar to studies done in Gondar and Pokot region of Uganda, Kenya and Somalia. Other symptoms were abdominal swelling, night sweating, weight loss, malaise and easy fatigability appeared in 82-83% of all patients and in all patients with visceral leishmaniasis. In Kenyan and Ugandan study the clinical presentations were weight loss (87.8%), spleen enlargement (77.1%), headache (14.6%), abdominal swelling (11.4%). The prevalence of

abdominal swelling was different in the two settings which is because the studies used splenic enlargement as a separate variable and if we combine both splenic enlargement and abdominal swelling the results will be comparable with this study. Epistaxis occurred in 22.6% of patients with VL and it was almost similar to the study done in Kenya and Uganda (21.9%) but in the Gondar study it was 76.4%. Both itching and skin lesions occurred in all patients (100%) with cutaneous and mucocutaneous leishmaniasis. Moreover, skin lesions occurred in 1.05% of patients with visceral leishmaniasis. Mucosal lesions occurred in 6.52% of all patients. It occurred in all patients with mucocutaneous leishmaniasis and 2.1% of patients with visceral leishmaniasis. There was no patient with prior history of leishmaniasis treatment from available records.

Visceral leishmaniasis was the most commonly diagnosed type of leishmaniasis (82.6%) and cutaneous (12.6%) and mucocutaneous leishmaniasis (4.8%) follow. There was no case of post kala-azar dermal leishmaniasis in the respective period.

From this survey it was found that many patients had additional diagnoses, and all were made in patients with visceral leishmaniasis. For example all patients with visceral leishmaniasis had anemia in some form (mild, moderate or severe) and in the Gondar About 195(88.2%) of patients with VL had signs of anemia (pallor). Whereas in the Kenyan and Ugandan study 45.8% had signs of anemia, 24.7% had severe acute malnutrition and 27.6% had moderate malnutrition which surpasses the findings from this study, 6.5% of patients with visceral leishmaniasis have SAM and of these 37% is in patients who are <5 years old. 1.05% of patients with visceral leishmaniasis had HIV/AIDS and 2.1% had malaria and in the Kenyan study Concomitant HIV infection was 2.3% and other 3.8% to 34.4% had concomitant malaria. But in the Gondar study HIV was diagnosed in 41% of patients who agreed for testing.

Of All admitted and out patients, 93.4% were treated with sodium stibogluconate, 5.7% were treated with sodium stibogluconate plus paromomycin and 0.9% were given amphotericin and no patient was given miltefocine. In the Gondar study, Sodium stibogluconate was given to 213(96.5%) visceral leishmaniasis patients. From the treated cases, 157(73.7%) were declared clinically cured, 52(24.4%) died in the hospital and four reported back with relapse.

230 patient records were found between 2014 and 2015 G.C and out of these 221(96.1%) were improved with treatment and have long term follow up till date. 4.3% had complications(sepsis and DIC primarily were documented) and 3.9% died over two years period. In Somali study overall

case fatality rate was 3.9% and clinical recovery rate was 93.2% and it was 1% in Kacheliba and 3% in Amudat hospitals and it was 3.8% for HIV negative patients in Kahsay Abera hospital, humera (it was 24.5% for HIV positive patients with VL).

CONCLUSION

- ✓ Most patients with leishmaniasis are children, adolescents and young adults
- ✓ Leishmaniasis is more common in males than in women
- ✓ The study population has heterogeneous religions which include Christianity, Muslim and local religions
- ✓ The disease is spread in 11 zones in Oromia and SNNPR regions which consist around 29 woredas
- ✓ Different zones and Woredas have difference in the prevalence of different types of leishmaniasis
- ✓ All patients with visceral leishmaniasis had fever, abdominal swelling, malaise, easy fatigability, headache, and night sweating and weight loss. Almost one fourth of patients have epistaxis and few patients had skin lesions.
- ✓ All patients with cutaneous and mucosal leishmaniasis presented with itching and skin lesions
- ✓ Sodium stibogluconate is the first line of drug in treating leishmaniasis and more than ninety percent of patients were treated with sodium stibogluconate.
- ✓ 96.1% of patients had improvement and were discharged and have long term follow up till date
- ✓ 4.1% of patients had complications and 3.9% of them died over two year period

RECOMMENDATIONS

It is very good that there was a research center on leishmaniasis at Arbaminch hospital. Yet, the organization (YALE Arbaminch hospital leishmaniasis research center, DNDi) which is funded by the CDC and WHO have left the center after a decade of stay. The hospital had a standardized leishmaniasis sign and symptom chart which was filled properly for research purposes. All patients with visceral leishmaniasis had their follow up with subsequent splenic aspirations. Patients have proper admission and discharge history with their address. All medical complications and other diagnosis were properly documented in their charts and it was easy to track patient records.

One thing I would like to recommend is that, since we mapped out hot spots of leishmaniasis in region, the regional health bureau has to assign health workers and specially trained professionals

in these places. Since the disease is still there, it needs active surveillance which has to be supported and guided by federal ministry of health.

Health education to peoples has to be implemented in order to decrease burden of the disease in the region. The government has to empower health centers by supplying them with adequate health professionals who are specially trained for leishmaniasis.

LIMITATION OF THE STUDY

- ✓ Lack of published reports about leishmaniasis in the same area
- ✓ Distance of the city from Addis Abeba, which hindered the due process of the research
- ✓ Lack of adequate time to accomplish a high quality research due to busy internship schedule

COMMUNICATIONS OF RESULTS

The result of the study will be disseminated to relevant bodies such as department of public health of St. Paul's hospital millennium medical college, Federal Ministry of Health, Regional health bureau, zonal and district health offices and district administration of the study area etc. The study results will also be disseminated to all concerned bodies especially governmental and nongovernmental organizations that mainly focus on eradicating the illness from the region.

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Annexes

Questionnaires

1. Age
2. sex
 - a. Male
 - b. Female
3. Religion
4. Region
 - a. SNNPR
 - b. Oromia
 - c. Somali
 - d. Other
5. Zone specify
6. Woreda specify
7. Clinical presentation
 - i. Fever a. yes b. no
 - ii. Headache a. yes b. no
 - iii. Abdominal swelling a. yes b. no
 - iv. Weight loss a. yes b. no
 - v. Night sweating a. yes b. no
 - vi. Easy fatiguability a. yes b. no
 - vii. Malaise a. yes b. no
 - viii. Epistaxis a. yes b. no
 - ix. Skin lesions a. yes b. no
 - x. Itching a. yes b. no
8. Prior history of leishmaniasis
 - a. Yes b. no
9. Clinical diagnosis
 - a. Cutaneous leishmaniasis
 - b. Mucocutaneous leishmaniasis

- c. Visceral leishmaniasis
 - d. Post kala-azar dermal leishmaniasis
10. Associated diagnosis
- a. SAM
 - b. HIV/AIDS
 - c. Malaria
 - d. Anemia
 - e. Other specify
11. Treatment regimen
- a. SSB
 - b. SSB + paromomycin
 - c. Miltefocine
 - d. Amphotericin
12. Treatment outcome
- a. Improved
 - b. Complication
13. Complications
- a. Sepsis
 - b. DIC
 - c. Disfigurement of the nose and lips
 - d. Death
14. Long term follow up
- a. Yes
 - b. no