

MODULE

Leishmaniasis

Diploma Program
For the Ethiopian Health Center Team



Abyot Desta, Solomon Shiferaw, Andargachew Kassa,
Techalew Shimelis, and Simachew Dires

Debu University

In collaboration with the Ethiopia Public Health Training Initiative, The Carter Center,
the Ethiopia Ministry of Health, and the Ethiopia Ministry of Education

2005



Funded under USAID Cooperative Agreement No. 663-A-00-00-0358-00.

Produced in collaboration with the Ethiopia Public Health Training Initiative, The Carter Center, the Ethiopia Ministry of Health, and the Ethiopia Ministry of Education.

Important Guidelines for Printing and Photocopying

Limited permission is granted free of charge to print or photocopy all pages of this publication for educational, not-for-profit use by health care workers, students or faculty. All copies must retain all author credits and copyright notices included in the original document. Under no circumstances is it permissible to sell or distribute on a commercial basis, or to claim authorship of, copies of material reproduced from this publication.

©2005 by Abyot Desta, Solomon Shiferaw, Andargachew Kassa, Techalew Shimelis, and Simachew Dires

All rights reserved. Except as expressly provided above, no part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without written permission of the author or authors.

This material is intended for educational use only by practicing health care workers or students and faculty in a health care field.

ACKNOWLEDGMENTS

We are greatly indebted to the Carter Center for supporting the preparation and development of this module as part of the Ethiopian Public Health Training Initiative.

The development of the module has gone through series of workshops, meetings and individual as well as group work within the institution.

Our special heartfelt thanks goes to the reviewers – Dr. Solomon Teshale and Tariku Lambiyo for their constructive comments. Most of their comments are being incorporated as part of the module.

We are also grateful to Mr. Akilu Mulugeta for the overall organization of the workshop and logistic support during the process of module development.

The contribution of the secretary, Ms. Birhane Abebe, to this module is also commendable.

TABLE OF CONTENTS

Contents	Page
Acknowledgement	i
Table of contents	ii
UNIT ONE: Introduction	1
1.1 Purpose and use of module	1
1.2 Directions for using module	2
UNIT TWO: Core modules	3
2.1 Pretest	3
2.2 Significance and definition of Leishmaniasis	9
2.3 Learning Objectives	9
2.4 Definition	9
2.5 Epidemiology	9
2.6 Etiology	13
2.7 Clinical features	14
2.8 Diagnosis	18
2.9 Case Management	19
2.10 Prevention and control	21
2.11 Post test	23
UNIT THREE: Satellite Modules	24
3.1 Health officer	24
3.2 Public Health Nurse	37
3.3 Medical Laboratory Technicians	46
3.4 Environmental Health	59
3.5 Health service extension workers	68
UNIT FOUR: Roles and Task Analysis	76
UNIT FIVE: Glossaries	79
UNIT SIX: Abbreviations	80
UNIT SEVEN: Bibliographies	81
UNIT EIGHT: Annexes	82

UNIT ONE

INTRODUCTION

1.1 Purpose and use of the modules

This module is prepared for public health officers, diploma nurses, environmental health Workers and Laboratory technicians who need to work as cooperative team members. Other categories and members of health centre team could also use this module.

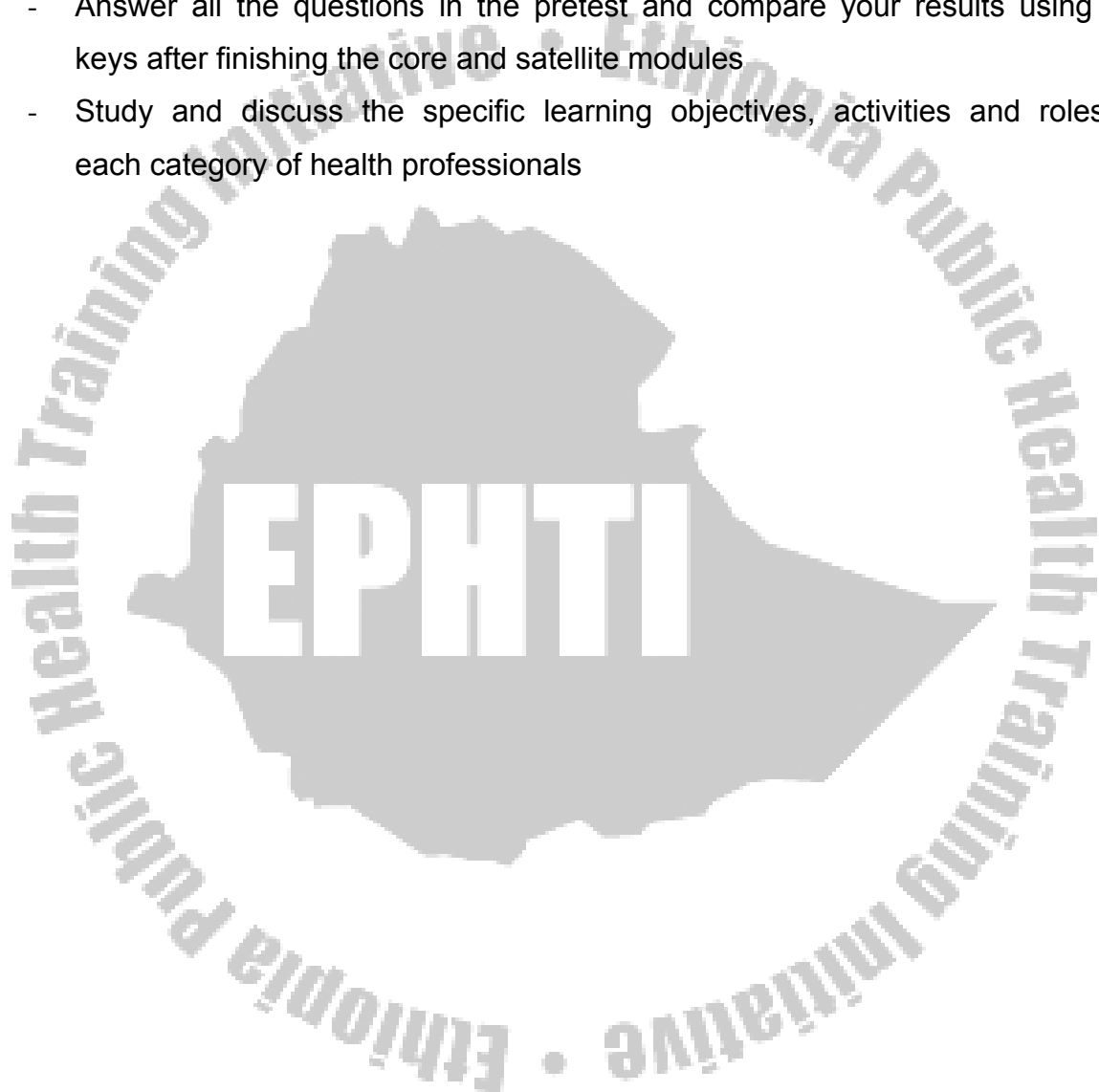
The module will serve as a practical guide to the management of several forms of leishmaniasis. It is believed that this module will provide the theoretical background of knowledge for health centre team staff in different disciplines with practical approach. However, it doesn't mean that it should substitute other reference materials and textbooks.

The module emphasizes teamwork. The core module gives details of what all categories of members of a health centre team at diploma level should know. The satellite modules however concentrate on specific tasks and skills that need to be acquired by each category of health centre team. The contents of satellite module include specific topics that are not addressed by the core module, but are essential to each professional category.

We hope that, after going through this module, the health professional will understand what every member of the health centre team will contribute. They will identify the tasks and activities required in preventing and controlling leishmaniasis and above all, they will know what is expected of them in controlling and preventing the disease.

1.2 Direction for using the modules

- Try to study and answer all the questions in the pre-test that is for all Categories in the core module and specific questions to your category.
- Read and try to understand each of the learning activities
- Each category of health professionals read their respective satellite module
- Answer all the questions in the pretest and compare your results using the keys after finishing the core and satellite modules
- Study and discuss the specific learning objectives, activities and roles of each category of health professionals



UNIT TWO

CORE MODULE

2.1 Pretest

Before going in to the core module, attempt to answer all questions.

2.1.1 All categories of the Health Center Team

1. What group of organisms causes leishmaniasis _____?
2. The vectors important for leishmania transmission are called _____?
3. List the types of possible reservoir of the leishmania parasite
4. What types of Leishmaniasis do you know? _____
5. Which one is the commonest route of Leishmania transmission
 - A. Blood transfusions
 - B. Sexual
 - C. Sand fly bite
 - D. Transplacental
 - E. Accidental inoculation
6. People at high risk of developing Leishmaniasis are
 - A. Adults living in endemic areas
 - B. Children in endemic areas
 - C. Travelers to endemic areas
 - D. Pregnant mothers
 - E. B and C
7. What diagnostic method is commonly used in our set up
 - A. Giemsa stain of aspirate and slit skin smear
 - B. Culture
 - C. Animal inoculation
 - D. ELISA
 - E. Biopsy
8. Which geographical sites of our country harbor the disease?
9. What general leishmania control measures could be taken?

2.1.2 Pre-test for specific categories of the health center team

2.1.2.1 Health Officer

- Which one is the average incubation period of visceral leishmaniasis
 - 2–6 months
 - 1-3 weeks
 - 2 –4 days
 - 2 –10 yrs
 - None
- The clinical manifestations of visceral leishmaniasis do not include
 - Fever
 - Hepatosplenomegally
 - Wasting
 - Grey discoloration of skin
 - Loss of consciousness
- When are sand flies active?
 - During the day
 - Dusk to dawn
 - Always
 - Noon
- Why do female phlebotomiae need to suck blood _____?
- The stages of the parasite in humans and sand flies are respectively called _____ and _____.
- The types of cutaneous Leishmaniasis are _____?
- Kala – azar is applied for visceral Leishmaniasis due to _____?
- Visceral Leishmaniasis can give rise to all forms of fever
 - True
 - False
- The Leishmania parasites in samples taken from patients seen under the microscope are called _____?
- Leishmaniasis involving mucosa of mouth and nose is known as _____?

11. The management of visceral Leishmaniasis include

- A. Correcting nutritional deficiency
- B. Blood transfusion
- C. Treating secondary infections
- D. Treating with anti leishmania drug
- E. All

2.1.2.2 Medical Laboratory

1. One of the following morphologic features cannot describe amastigote stage

- A. Round to oval in shape
- B. Has free flagellum
- C. Has eccentric nucleus
- D. Has no undulating membrane

2. _____ is the stage of leishmania detected from spleen aspirate

- A. Promastigote
- B. Amastigote
- C. Trypomastigote
- D. Epimastigote

3. _____ Causes visceral leishmaniasis

- A. L.aethiopica
- B. L.major
- C. L.donovani
- D. L.tropica

4. _____ is the stage of leishmania obtained from culture media

- A. Promastigote
- B. Amastigote
- C. Trypomastigote
- D. Epimastigote

5. Among the following diagnostic means one has little value in the diagnosis of cutaneous leishmaniasis.
- A. Examining slit skin smears for amastigotes
 - B. Testing leishmania antibodies in serum
 - C. Culturing the material collected from nodule
 - D. None
6. In Formol gel (aldehyde) test, whitening and gelling of serum within 20 minutes indicate _____
- A. Positive test
 - B. Negative test
7. Among the following tests one is non-specific for the diagnosis of VL
- A. ELISA
 - B. IFAT
 - C. DAT
 - D. Formal gel test
8. One is not true when using Giemsa staining technique
- A. The stock should be diluted 1:10 to stain the smear
 - B. Diluted Giemsa staining solution can be used for longer than 24 hour
 - C. The PH of the solution should be 7-7.3
 - D. Buffered saline can be used to dilute the stock stain
9. Among the following samples one is best for the diagnosis of cutaneous Leishmaniasis
- A. Spleen aspirate
 - B. Bonemarrow aspirate
 - C. Buffy coat smear
 - D. Slit skin smear
10. Identify a species that is not relevant to Ethiopia
- A. L. donovani
 - B. L. aethiopica
 - C. L. major
 - D. L. mexicana

2.1.2.3 Environmental Health Science

Instruction – Choose the best answer

- 1) Why insecticidal control of sand fly larvae remains impossible?
 - A. The breeding sites of most species are unknown or secretive
 - B. Even when the breeding sites are identified, they are too diverse and impractical to reduce larval number
 - C. Their larvae float on water surface and hides itself
 - D. A and B
- 2) Which of the following **is not** true about the external morphology of phlebotomus sandflies
 - A. The palps are as long as the proboscis
 - B. Hairy appearance
 - C. Have long and stilt like legs
 - D. Their wing held erect over
- 3) The eggs of sand fly are deposited:
 - A. On surface water
 - B. On cracks and holes in the ground
 - C. On floating substance of water
 - D. All
- 4) Larva of phlebotomine sand fly development depend on the following **except**
 - A. Temperature
 - B. Food supply
 - C. Water flow
 - D. Species
- 5) Phlebotomine sand fly have a relatively short flight range, so that it is easy to control by-----
 - A. Insecticidal spraying
 - B. Protective clothes
 - C. Impregnated bed net
 - D. Replants

- 6) Which of the following methods can effectively prevent phlebotomine sand flies?
- A. By destroying the reservoir
 - B. By forest clearance
 - C. By applying insecticides
 - D. All
- 7) Which of the following is an impractical method of prevention of leishmaniasis?
- A. Environmental management
 - B. Destroy the reservoirs
 - C. Personal protective
 - D. Applying insecticide
- 8) Which of the following **is not** the characteristics of phlebotomine sand fly
- A. Active during night and dusk
 - B. Rest in dark moist areas
 - C. Active only during the day
 - D. Endophilic and exophilic
- 9) Which of the following is a protective method of leishmaniasis at the individual level?
- A. Reducing breeding sites
 - B. Applying insecticides
 - C. Using replants
 - D. Forest clearance
- 10) The epidemiology of leishmaniasis largely determined by
- A. The species of sand flies, their ecology and behavior
 - B. The availability of the wide range of hosts
 - C. The species and strains of leishmania parasites
 - D. All
- 11) "Forest – free- belt" means
- A. Afforestation
 - B. Forest clearance
 - C. Kill wild reservoirs
 - D. Filling cracks or burrows

12) Old world Leishmaniasis is transmitted by-----

- A. Phlebotomus species
- B. Lutzomia species
- C. Anopheles species
- D. Culex species

2.2 Significance and brief description of Leishmaniasis

Leishmaniasis is one of the causes of morbidity and mortality in Ethiopia. It has been reported that cases of leishmaniasis occur in western parts of the country mainly but also in southern & eastern regions. People living in the low lands of aforementioned areas have always been at risk.

2.3 Learning objectives

Upon the completion of the activities in this module, the learner Will be able to:

1. Describe the causes and clinical pictures of Leishmaniasis
2. Make appropriate diagnosis of Leishmaniasis at individual and community level
3. Treat Leishmaniasis as recommended
4. Identify and name the different control measures for Leishmaniasis
5. Understand and identify the tasks and roles of the team members in a health Centre

2.4 Definition

Leishmaniasis are a group of parasitic diseases caused by protozoan flagellates of the genus Leishmania, transmitted through the infective bite of an insect vector, the phlebotomine sand fly.

2.5 Epidemiology

Magnitude

Global: Leishmaniasis is threatening 350million people in 88 countries on four continents. The annual incidence of new cases is estimated between 1.5 and 2 million.

There are estimated 12million cases worldwide. In numerous under developed countries, they remain a major public health problem.

Ethiopia: As mentioned earlier the disease affects people living in a significant portion of the country. Not a significant number of studies have been done in our country to determine the magnitude. The burden of visceral leishmaniasis is not well studied in Ethiopia. However, few reports substantiate the seriousness of VL in Ethiopia and neighboring countries. Surveillance of VL in Aba Roba community, Gemu Gofa has revealed an annual incidence of 5.2/1000 population. Other reports have identified endemic areas and sporadic cases in various localities. Recurrent epidemics of visceral leishmaniasis have occurred in Metema and Humera. Following agricultural development in the region a large number of labor migrants from the highlands were moved to the endemic areas in the late 1970 for crop harvesting. This led to out breaks of VL, which resulted in high morbidity and mortality. The overall prevalence of cutaneous leishmaniasis was 3.6-4.0%, with a peak value of 8.55 in the 0-10 years old age group in Ochollo (Gemu Gofa).

Geographical distribution

Global: Leishmaniasis are widely distributed around the world. They range over inter-tropical zones of America, Africa and extend in to temperate regions of South America, southern Europe and Asia. Their extension limits are latitude 45⁰ north and 32⁰ North.

Ethiopia: Several studies have definitively demonstrated that VL occurs in northwestern Ethiopia (Humera, Metema), Segen and Woito valleys in Gemu Gofa. Sporadic cases of VL have been diagnosed from Wolkayit Tsegede (Gondar), Gibdo, Raya, and Kobo (Wello), Kijawa (Gambella) and Gelana (Sidamo) and Genale (Bale) river basins. Recently a devastating epidemic occurred in Humera with an estimated annual incidence of 1,500-2,000 cases. Due to high mortality, occurrence of epidemics, and high incidence of the disease in 15-45 age group leishmaniasis has become one of the leading health problems in Ethiopia.

Cutaneous leishmaniasis (CL) occurs in highlands of Ethiopia. Transmission occurs in Cuttaber (Dessie), Aleku (Wellega), and Ochollo (Gemu Gofa). In Ochollo the overall prevalence of localized CL was 3.6-4.0%, with a peak value of 8.55 in the 0-10 years old age group. Sporadic cases of CL have been diagnosed from many localities in the northern, central, and southern high lands of Ethiopia.

Vector

Sand flies are Diptera of the family psychodidae, subfamily phlebotominae. Their life cycle includes two different biological stages; the flying adult and the development phases of egg, larva and pupa.

The adults are small flying insects of about 2-4mm in length, with a yellowish hairy body. During the day, they rest in dark & sheltered places. They are active at dusk & during the night.

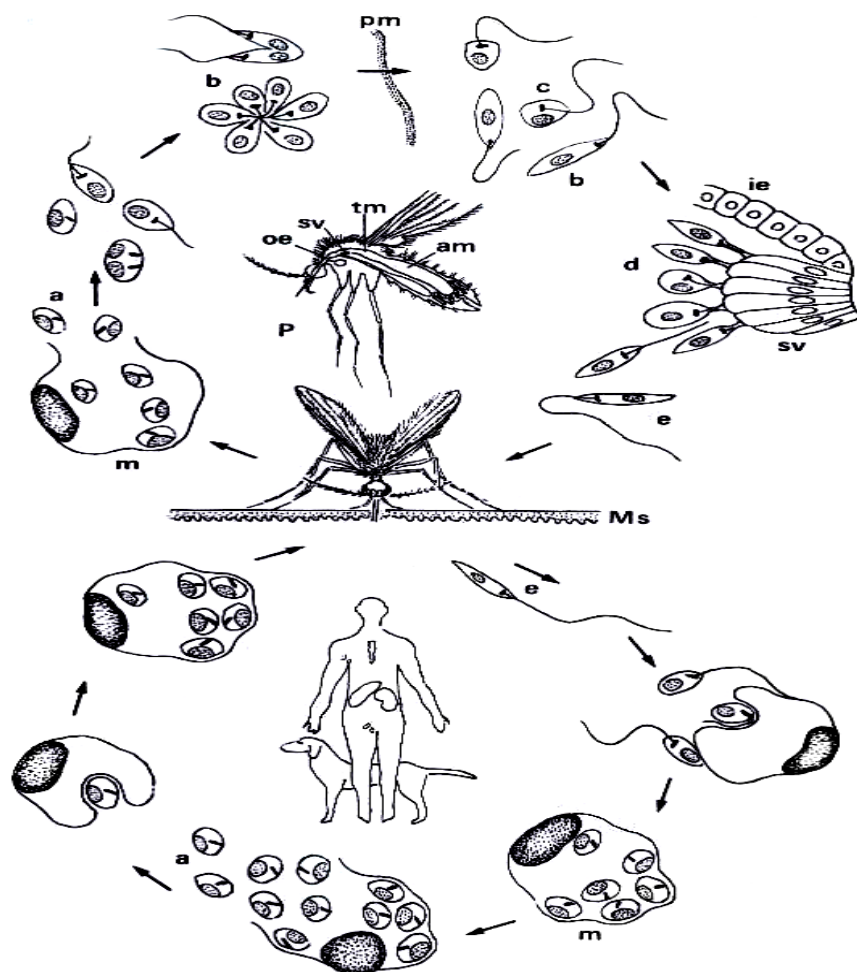
Both sexes feed on plants, but females also need a blood meal before they are able to lay eggs.

Reservoir

Most leishmaniasis is zoonosis and the reservoir hosts are various species of mammals. Depending on the focus, the reservoir can be either a wild or a domestic mammal. In particular cases, human beings can be the host also.

Life cycle

In nature, Leishmania are alternatively hosted by the insect (flagellated promastigotes) and by mammals (intracellular Amastigotes). When a female sand fly takes blood meal from an infected mammal; the insect ingests intracellular Amastigot. Inside the fly Amastigot are transformed in to flagellated promastigotes in the mid gut. The promastigotes migrate into the anterior portion of the mid gut. The bite of an infected sand fly deposits infective promastigotes in the mammals' skin, which are rapidly phagocytosed by the cells of mononuclear-phagocyte system. The intracellular parasites change into amastigotes, which multiply by simple mitosis.



Picture: Life Cycle of Leishmania Parasites

Transmission

Leishmaniasis is a vector borne disease. It is mainly transmitted from the reservoir host to the healthy individual by the bite of female phlebotomus sand fly. The inoculation of promastigotes through the sand fly bite is the usual method of leishmaniasis transmission.

In visceral leishmaniasis, a few cases of congenital and of blood transfusion transmission have been reported. Exchange of syringes has been incriminated to explain the high prevalence of *L. infantum* /HIV infection in intravenous drug abusers in southern Europe.

Predisposing factors

Young children, travelers who are non-immune, refugees displaced people and laborers entering in to leishmania area are groups who are at risk of getting leishmaniasis.

Population movements, such as rural to suburban migrations are factors for visceral leishmaniasis extension, by exposing thousands of non-immune individuals to the risk of infection. Economic developments resulting in movement of population caused dramatic out breaks in parts of the world. People in rural areas with limited access to health services are the most affected.

Immunodeficient patients, particularly those with HIV infection, have been found to develop visceral Leishmaniasis more frequently when compared to normal individuals.

2.6 Etiology

The disease is caused by species of Leishmania.

Leishmania are dimorphic parasites, which present as two principal morphological stages: the intra cellular amastigotes in the mononuclear phagocytic system of mammalian host, and flagellated promastigote in the vector.

Classification: there are different species of the genus Leishmania, the majority of which commonly infect humans in whom they are responsible for various types of diseases: visceral, cutaneous (of diffuse or localized types) and mucocutaneous leishmaniasis.

The parasite has been classified into two subgenera: Leishmania sensu stricto present in both Old world and New Worlds, and viannia restricted to the New World. With in these two subgenera various species complexes were individualized.

Table: Major Leishmania species that cause disease in humans

Species	Clinical Syndrome	Geographical Distribution
Subgenus sensu stricto		
L.donovani complex		
L. donovani	VL (PKDL, OWCL)	China, Indian Subcontinent, South western Asia, East Africa
L. infantum	VL (OWCL)	China, Indian subcontinent, Southwestern Asia, East Africa, Southern Europe.
L. chagasi	VL (NWCL)	Central and South America
L.mexicana complex		
L. mexicana	NWCL (DCL)	Texas, Mexico, South and Central America
L. amazonensis	NWCL(ML, DCL, VL)	Panama and South America
L. tropica	OWCL(VL)	India, Central Asia, South western Asia, Middle East, North & Central Africa, East Africa
L. Major	OWCL	India, Central Asia, South western Asia, Middle East, North and Central Africa, East Africa
L. aethiopica	OWCL(DCL)	Ethiopia, Kenya
Subgenus viannia		
L. (V). braziliensis	(ML)	South America
L. (V.) guyanensis	NWCL (ML)	South America
L. (V.) Panamensis	(ML)	America, Venezuela , Columbia,Equador, Peru
L. (V) Peruviana	NWCL	Peru

Abbreviations-VL-Visceral Leishmaniasis; PKDL-Post Kala-Azar Dermal Leishmaniasis; OWCL-Old World Cutaneous Leishmaniasis, NWCL-New World Cutaneous Leishmaniasis; DCL-Diffuse Cutaneous Leishmaniasis; ML-Mucosal Leishmaniasis

2.7 Clinical Features

(A) Visceral Leishmaniasis (VL)

Incubation Period

The incubation period is difficult to evaluate precisely. It is generally 2-6 months, but can range from 10 days to many years

Disease Onset

The onset of disease may be sudden or gradual, the over all condition of the patient is usually good in the early stages.

Symptoms and signs

- **Fever**

Fever is the major symptom with rapid rise in sudden onset and slow rise in gradual onset. It is intermittent and irregular, with double or triple rise per day usually to 38 – 39⁰ c, but possibly reaching 40 – 41⁰c. It lasts for some weeks followed by a pyrexial period.
- **Weight loss**

Asthenia, loss of appetite and prominent muscle wasting of extremities is prominent feature in well-established VL
- **Splenomegaly**

Splenomegaly appears early and is almost invariably present. The spleen size increases regularly with duration of the disease eventually extending down to the left hypochondrium
- **Hepatomegaly**

Less frequent and appears later than Splenomegaly. Liver is slightly enlarged and painless. Rarely jaundice appears in later stages and is poor prognostic sign.
- **Diarrhea**

Frequently reported and is due to ulceration of digestive mucosa
- **Cough**

Can occur as a result of pulmonary involvement with a dry, non-productive cough.
- **Anemia**

Responsible for extreme paleness of skin and mucosa, giving grey appearance of patients (hence "kala-azar" – black fever)
- **Bleeding**

Episodes of bleeding as epistaxis and rarely bleeding from gums, purpura, and petechiae can occur
- **Ascites**

Considered as a late sign and bad prognostic sign, sometimes associated with edema and pleural effusions.



Picture2: A patient with Visceral Leishmaniasis showing significant muscle wasting and protuberant abdomen due to big spleen

Biological Parameters

- Pancytopenia
 - Normochromic and normocytic anemia
 - Leucopenia with neutropenia responsible for associated infection
 - Thrombopenia responsible for bleeding with alterations of hepatic coagulation factors.

- Raised ESR, C reactive protein(CPR)
- Disturbed plasma protein profiles with low albumin levels and hyper gammaglobulinemia

(B) Cutaneous Leishmaniasis (CL)-Oriental sore

CL presents as skin lesions, which are generally localized, without involvement of the mucosa, and not generalized infection. They occur on exposed parts of the body accessible to sandflies: face, hands, forearms and lower limbs. Rarely, dermatotropic parasites may give rise to disseminated CL, with multiple nodules on large areas of the skin.

Localized Cutaneous Leishmaniasis (LCL): All species of Leishmania can cause localized CL.

- Incubation period ranges from weeks to months
- Starts as erythematous papule to reach its definitive size in a few weeks
- The mature lesion is well defined with regular outline, round to oval in shape, variable dimension (0.5 – 10 cm on diameter) and usually multiple.
- It can be ulcerative or dry with papulo nodular lesion covered by scales

Diffuse Cutaneous leishmaniasis (DCL): some specific species of Leishmania can cause a diffuse form of CL

- A non- ulcerative nodule rich in parasites represent this form of the disease
- Starts as an isolated nodule then joining to form large patches disseminated all over the body.

- It is related to a defective immune system of the patient. The lesions resemble that of leprosy and do not heal spontaneously and relapse is common after treatment.

(C) Mucocutaneous Leishmaniasis (MCL)

MCL is due to *L. braziliensis* and *L. Panamensis* occasionally. It is seen in the New world and they call it “Espundia”.

It has two stages. The first one is a primary cutaneous lesion, which eventually is followed by mucosal involvement.

The cutaneous lesion is similar with localized cutaneous leishmaniasis and the mucosal involvement start with the nasal mucosa later on destroying the nasal septum. The buccal mucosa is involved at later stages and the disease can progress to lips, palate and larynx.

(D) Post Kala-Azar Dermal Leishmaniasis (PKDL)

After a latent period of 1 year following kala-azar cure, skin lesions can appear in around 20% of cases. Beginning as depigmented macules, turn in to papular and then to nodular eruptions. Located initially on the face they can extend to the whole body.

2.8 Diagnosis

- (1) History of residence and travel to Leishmania area
- (2) Clinical history and physical finding
- (3) Laboratory finding

Definitive diagnosis is based on the detection of the parasite or its DNA samples

Sample Collection

- Bone marrow and spleen aspirations for visceral Leishmaniasis

- Superficial skin/Mucosal scraping for cutaneous and mucocutaneous leishmaniasis

Detection methods

- The sample collected can be
 - stained with panoptic May Grunwald Giemsa stain
Amastigotes seen in monocytes or out side; called Leishman Donovan (LD) bodies
 - Cultured – NNN medium
_Grow as promastigotes
 - Inoculated into lab animals(Golden Hamster)
 - Molecular diagnosis by DNA detection or PCR technique

2.9 Case management

(A)Visceral Leishmaniasis

1. Provision of anti-leishmania drug
2. Correcting Nutritional deficiencies
3. Blood transfusion in case of severe anemia
4. Treating secondary bacterial infection

Drugs

1. Antimonials

- Sodium stibogluconate (pentostam®), meglumine antimonite (Glucantime®) are available. They have poor oral absorption; hence have only parenteral route.
- Supplied:-
 - sodium stibogluconate as 100mlbott (100mg sb^v /ml)
 - meglumine antimonite as 5ml ampule (85mg sb^v /ml)
- Dose is 20 mg sb^v /kg per day for 28 days on daily bases

2-Amphotericine B

- powerful antileishmanial used in the treatment of severe Leishmaniasis (VL , MCL) or forms resistant to Antimonials
- it is alternative 1st line drug
- formulated as a colloidal suspension which is administered as slow (6–8 hr) IV infusion 0.5-1mg/kg dissolved in 500 ml dextrose 5% on alternate days
- 14-20 infusions for a total dose of 1.5gm

3-Pentamidine

- restricted to treatment of CL
- 4mg/kg per injection
- Im or IV on alternate days
- short courses (four doses) for CL
- Long courses (period of weeks) for resistant VL

Clinical response in visceral leishmaniasis is slow. The patient becomes afebrile after 4-5 days of treatment; other clinical symptoms and biological parameters slowly regress.

(A) Localized CL

Management depends on the type and characters of the lesions, the Leishmania species involved the risk of extension and patients preference.

Possibilities are abstention, local or systemic treatment.

(B) Diffuse CL

Once established, DCL has proved to be resistant to treatment. Systemic pentavalent antimonial can improve clinical situation. There is a need to try other new products like liposomal amphotericine B and IFN γ .

(D) MCL

It is important to give systemic treatment before primary cutaneous lesion extends to facial mucosae. Once it involves the mucosa, treatment should be fast and with antimonials injected for 28 days. Amphotericin B can be used for poorly responding cases.

2.10 Prevention and Control

Intervention strategies for prevention and control are hampered by the presence of many reservoir hosts and multiplicity of sand fly vectors. There are many eco-epidemiological entities each requiring distinct control strategies.

Prevention

Aim of prevention

- Avoiding host infection
- Preventing subsequent progression to disease

Strategies

- Early diagnosis and treatment
- Prevent intrusion of people in to natural zoonotic foci
- Protect against infective bites of sand flies
- Health education
- Community participation

Individual prevention

- Avoiding risk of exposure: Avoid vicinity of sand fly breeding sites or resting sites
- Mechanical means: self protection from sand fly bite by wearing clothes, bed nets
- Chemical means: repellants applied to the skin

Collective measures

- Forest clearance: establishment of forest free zone of about 400 meters around human settlements
- Indoor residual spraying

Control

Aim of control

- interrupt life cycle of parasite
- limit or eradicate the disease

Targets are the vector and the reservoir

Strategies

Depend on ecology and behavior of the main targets

- Case detection and treatment: when reservoir is human
- Wild reservoir control: when reservoir are rodents , not applicable to other mammals
- Sandfly control
 - Destruction of breeding sites
 - Insecticide spraying

Other Methods

- Health talks.
- Mass media includes news papers , leaflets, radio , television
- Role plays and dramas
- Community participation

Topics for Health Education

1. Under taking Environmental control

- Forest clearance
- Destroying rodent sites
- Identifying sand fly breeding sites and destruction of those sites

2. Reduction of contact between people and sand flies

- Selection of settlement sites , should be at least 400 meters away form breeding and shading sites
- Clearing trees and vegetation around living and working areas

- Increase use of insecticide impregnated bed nets
 - Use of screen on windows
 - Wearing protective clothing
 - Applying insect repellants on the skin
3. Early reporting to nearest health institution when symptoms are detected
4. Community participation
- Importance of community participation and
 - Intersectoral collaboration
5. Traditional malpractice
- Study the traditional treatment & patient care procedures of leishmaniasis and identify useful and harmful practices
 - Based on the information and observations conduct studies to establish the usefulness of traditional healing methods in collaboration with other institutions.

2.11 Post Test

Do the pretest again to evaluate how much you have grasped

UNIT THREE

SATELLITE MODULES

3.1 SATELLITE MODULE FOR HEALTH OFFICERS

3.1.1. Introduction

3.1.1.1 Purpose

This satellite module is prepared for health officer students. The module emphasizes mainly areas which were not covered by the core module.

3.1.1.2 Direction

- Study the satellite module after going through the core module
- You are advised to refer to the core module whenever necessary
- After completing the satellite module answer all the questions in the pre and post tests
- Compare the results with the previous performance

3.1.2 Learning Objectives: after going through this module the reader will be able to

1. Diagnose the different forms of Leishmaniasis
2. Describe the common antileishmanial drugs, their dose, route of administration and adverse effects
3. Treat and follow patients having the different forms of Leishmaniasis
4. Organize Leishmania prevention and control programs

3.1.3 Definition

Leishmaniases refer to various clinical syndromes that are caused by obligate intracellular protozoa of the genus *Leishmania* (order Kinetoplastida).

3.1.4 Epidemiology

Geographical distribution

Leishmaniasis is endemic in diverse ecologic settings in the tropics and subtropics, ranging from deserts to rain forests and from rural to peri-urban areas.

Visceral Leishmaniasis

VL, which has been reported in 47 countries and continues to be epidemic in eastern India, has emerged in new geographic areas (e.g. Southern Sudan, where persons of all ages have been affected), in new settings (e.g. suburban areas in northeastern Brazil, where most cases have occurred in children < 10 years of age) and among new host population (e.g. HIV infected persons).

Vector

Leishmaniasis is transmitted by the bite of female phlebotomine sand flies (genus *Phlebotomus* (old world) or *Lutzomyia* (new world)).

Sand flies are diptera of the family psychodidae, subfamily phlebotominae. About 800 species of sandflies have been described. Among these species, about 70 belonging to the genera *Phlebotomus* and *Lutzomyia*, are proven or suspected vectors of *Leishmania*.

The adults are small flying insects of about 2-4 mm in length, with a yellowish hairy body. During the day they rest in dark and sheltered places (resting sites).

Reservoir

Leishmaniasis is typically a zoonosis, with rodents, small mammals and canines as common reservoir hosts and humans as incidental hosts.

In the old world, rodents and hyraxes are reservoirs of wild zoonotic cutaneous Leishmaniasis due respectively to *L. major* and *L. aethiopica*. In the new world, various Sylvatic mammals are reservoirs of American cutaneous Leishmaniasis.

Humans are the commonly recognized reservoir host of *L.donovani* visceral Leishmaniasis and *L.tropica* cutaneous Leishmaniasis

Life cycle:

Leishmania are alternatively hosted by the insect (flagellated promastigote) and by mammals (intracellular amastigote stage).

As the flies attempt to feed, they regurgitate the parasite's flagellated promastigote stage into the skin of mammalian hosts. Promastigotes attach to receptors on macrophages, are phagocytized, and transform within phagolysosomes into the non-flagellated amastigote stage.

Transmission

Inoculation of promastigotes through sand fly bite is the usual method of Leishmaniasis transmission and other routes remain exceptional.

In visceral Leishmaniasis, a few cases of congenital and of blood transfusion transmission have been reported. A case of direct transmission by sexual contact has been reported. Exchange of syringes has been incriminated to explain the high prevalence of *L.infantum*/ HIV co-infection in intravenous drug-users in southern Europe.

Etiology

Visceral leishmaniasis is typically but not exclusively caused by organisms of the *Leishmania donovani* complex (see table); old world cutaneous leishmaniasis by *L.tropica*, *L.major*, and *L.aethiopica*, new world (or American) cutaneous Leishmaniasis by organisms of the *L.mexicana* complex and the species now commonly placed in the subgenus *viannia* (*L. braziliensis*, *L.guyanensis*, *L.panamensis*, and *L.peruviana*); and mucosal Leishmaniasis by some organisms in the latter group.

3.1.5 Clinical features

Visceral Leishmaniasis: (in Hindi Kal-azar = 'black fever' indicating that the skin can turn gray)

Visceral infection can remain sub-clinical or can become symptomatic, with an acute, sub-acute or chronic course. In some settings inapparent infection far outnumber clinically apparent ones: malnutrition is a risk factor for the development of disease.

Incubation period (IP) – usually ranges from weeks to months but can be as long as years.

- Typically the patients are cachectic, febrile and are heavily parasitized and have life-threatening disease.
- Splenomegally (with the spleen most often soft and non tender) typically is more impressive than hepatomegally, and the spleen can in fact be massive.
- Peripheral lymphadenopathy is common in some geographic areas, including Sudan.

Laboratory findings:

In advanced disease include;

Pancytopenia- anemia, leukopenia (neutropenia marked eosinopenia, relative lymphocytosis and monocytosis) and thrombocytopenia- as well as hypergammaglobulinemia (chiefly involving IgG from polyclonal B cell activation) and hypoalbuminemia. Causes of anemia can include bone marrow infiltration, hypersplenism, autoimmune hemolysis, and bleeding.

Some patients develop, post-kalazar dermal Leishmaniasis [a syndrome characterized by skin lesions, including pigmented or depigmented macules, papules, nodules and patches that typically are most prominent on the face. These lesions can develop during or within few months after therapy (e.g. in E. Africa) or years after therapy (e.g. in India).

Visceral infection can relapse.

Diagnosis

- Demonstration of the parasite on stained slides or in cultures of a tissue aspirate or a biopsy specimen (e.g. of spleen, liver, bone marrow, or lymph node).
- Diagnostic yield is highest for splenic aspiration (specifically, as high as 98% for splenic aspirates versus less than 90 percent for other specimens), but this procedure can cause hemorrhage.

Patients who have kala-azar typically carry a relatively heavy parasite burden; develop high titers of antibody to *Leishmania* (diagnostically useful but not protective); and have undetectable *leishmania*-specific cell-mediated immunity. (With leishmanin skin test reactivity as well as lymphocyte proliferation noted only after recovery).

Differential diagnosis

Include other tropical diseases that cause fever or organomegally (e.g. typhoid fever, miliary tuberculosis, brucellosis, malaria with tropical splenomegally syndrome)

Treatment

1. The pentavalent antimonial compound- sodium stibogluconate (pentostam) – 20mg of sb^V/kg given IV or IM once daily for 28 consecutive days is first line therapy.
 - Typically patients feel better and become afebrile during the first week of treatment.
 - Abnormal laboratory findings and Splenomegally improve during therapy but may take weeks or months to resolve.
 - Reappearance of eosinophils in the leukocyte differential count is a good sign.
 - The best indicator of permanent cure is freedom from clinical relapse during at least 6 months of follow up.
 - Repeat tissue sampling is indicated if the patient's status is in question.
 - The possibility of HIV infection should be considered if the patient doesn't respond to therapy or repeated relapses.

2. In India (where unresponsiveness to sb^v therapy is becoming increasingly problematic, amphoterecin-B (0.5 to 1.0 mg/kg daily or every other day, given intravenously for a total dose of 7 to 20 mg/kg) has been found to be a highly effective, though potentially toxic, alternative.
3. Pentamidine (2 to 4mg/kg daily for every other day, given intravenously or intramuscularly for at least 15 doses) is reasonably effective but may need to be administered in prolonged courses that are associated with toxicity.
4. Formulation of liposomal amphotericin-B may prove highly effective and less toxic
5. Various parenteral agents have been advocated as adjuncts to accelerate or improve the response to sb^v therapy.
 - Aminosidine (12 to 15 mg/kg per day, IV or IM)
 - Cytokine immunotherapy with subcutaneous injections of recombinant interferon- γ or granulocyte macrophage colony-stimulating factor.
 - Allopurinol
 - ketoconazole

VL in HIV infected persons:

VL is becoming an important opportunistic infection among persons infected with HIV-1 in geographic areas in which both infections are endemic.

- To date, most co-infections have been reported from southern Europe, where *Leishmania infantum* is endemic and visceral is no longer primarily a disease of young children. Co-infections are reported from Ethiopia.
- In HIV-infected patients, even relatively avirulent *Leishmanial* strains can disseminate to the viscera.
- Clinical Leishmaniasis in patients with HIV infection can represent newly acquired or reactivated infections. Most co-infected patients who have clinically evident Leishmaniasis have fewer than 200 CD 4 lymphocytes per micro liter.
- Co-infected patients can develop unusual manifestation of visceral leishmaniasis, in part because of atypical localization of the parasite (e.g. in the gastrointestinal tract)
- The diagnostic sensitivity of classic serologic methods is lower in co-infected than in immunocompetent patients (about 50 percent vs. 90 percent).

- On the other hand, parasitologic diagnosis by noninvasive means is easier in the case of co-infected patients.
- Co-infected patients may initially respond well to anti leishmanial therapy, albeit with more drug toxicity than is experienced by most immunocompetent persons. However, co-infected patients commonly have a chronic or relapsing course, seemingly irrespective of the drug regimens used for induction and suppressive therapy.

Cutaneous Leishmaniasis

Cutaneous Leishmaniasis has been reported from 61 countries. Traditionally it is classified as new world (American) or old world. Local names for new world disease include chiclero ulcer, pian bois (bush yaws), and uta; those for old world disease include oriental sore, bouton d'orient, Aleppo boil, and Baghdad sore.

In many affected regions, most cases occur in men who have forest related occupational exposures. The etiologic agents typically are those of the *L.mexicana* complex and the viannia group but also include *L.major*-like organisms and *L.chagasi*. Old world cutaneous leishmaniasis is caused by *L.tropica*, *L.major*, and *L.aethiopica* as well as *L.infantum* and *L.donovani*.

Incubation period: weeks to months

Local trauma can activate latent infection.

The first clinical manifestation is usually a papule at the site of the sand fly bite but is sometimes regional lymphadenopathy (sometimes bubonic) in *L. (V.) braziliensis* infection. Most skin lesions evolve from papular to nodular to ulcerative, with a central depression (which can be several centimeters in diameter) surrounded by a raised indurated border; some lesions persist as nodules or plaques. Multiple primary lesions, satellite lesions, regional adenopathy, sporotrichosis-like subcutaneous nodules, lesion pain or pruritus, and secondary bacterial infection are variably present.

The infecting species, the location of the lesion, and the host's immune response are major determinants of the clinical manifestation and chronicity of untreated lesions. For

example, in the old world, *L. major* tends to cause 'wet' exudative lesions that are less chronic than the "dry" lesions with central crusting that are caused by *L. tropica*.

The polyparasitic and oligo parasitic ends of the spectrum of cutaneous leishmaniasis are respectively represented by the rare syndromes of diffuse cutaneous leishmaniasis (DCL) and leishmaniasis recidivans, both of which are notoriously difficult to treat. DCL, caused by *L. aethiopica* (old world) or by the *L. mexicana* complex (new world), develops in the context of leishmania-specific anergy and is manifested by chronic, non-ulcerative skin lesions; on histopathologic examination of samples of these lesions, abundant parasites but few lymphocytes are noted. Leishmaniasis recidivans, a hyperergia variant with scarce parasites is usually caused by *L. tropica* and manifested by a chronic solitary lesion on the cheek that expands slowly despite central healing.

Diagnosis:

- histologic examination of dermal scrapings of debrided ulcerative lesions
- In-vitro culture of aspirates of skin lesions and lymphnodes
- Biopsy specimens for examination and culture. As lesions age amastigotes become more scarce and parasitologic confirmation becomes more difficult.
- serologic testing is an insensitive means for diagnosis of cutaneous leishmaniasis; antibody titers are at most minimally elevated except in patients who have DCL.

In contrast, leishmanin skin test reactivity usually is evident or develops in persons who have simple cutaneous evident or develops in persons who have simple cutaneous or recidivans leishmaniasis but not in those who have DCL.

Differential Diagnosis:

Tropical, traumatic and venous stasis ulcers, foreign body reactions, superinfected insect bites; impetigo fungal infection (eg. sporotrichosis), mycobacterial infection DCL and leishmaniasis must be differentiated from lepromatous leprosy and lupus vulgaris, respectively.

Treatment

Decision about whether and how to treat depend on

- the possibility of mucosal dissemination
- Lesion location (cosmetic implications), number, size
- evolution, and chronicity

When optimal efficacy is important sb^v= 20mg/kg (IV/or IM) once daily for 20 consecutive day; lower daily doses or shorter courses may have merit in some situations.

- pentamidine (3mg/kg IM, every other day for four doses) may be an effective alternative to sb^v.
- The imidazoles ketoconazole and itraconazole, allopurinol, and dapsone are probably modestly active.

Unless used in an adjunctive role, local or topical therapy should be considered only for the treatment of infection that doesn't have the potential for dissemination (eg for relatively benign lesions caused by *L. mexicana* or *L. major*). Examples of local approaches: application of ointment containing paromomycin and methylbenzethonium chloride, heat therapy and cryotherapy.

Mucosal Leishmaniasis

- Leishmanial infection of the nasopharyngeal mucosae is a relatively rare but potentially disfiguring metastatic complication of cutaneous leishmaniasis.
- Mucosal disease develops despite antileishmanial cell-mediated immunity and most commonly is caused by organisms of the viannia group (typically *L. (v.) braziliensis* but also *L. (v.) panamensis* and *L. (v.) guyanensis*).
- Although mucosal disease usually becomes clinically evident within several years after the healing of the original cutaneous lesions, cutaneous and mucosal lesions can exist simultaneously or can appear decades apart.

Typically, the original cutaneous lesions in these cases were not treated or were in adequately treated.

Clinical picture:

Mucosal involvement generally is manifested first by persistent unusual nasal symptom (e.g. epistaxis), with erythema and edema of the nasal mucosae, and then by progressive ulcerative, nasopharyngeal destruction.

Diagnosis:

Supportive laboratory data (e.g. a positive serologic test) are useful, but the scarcity of amastigotes makes parasitologic confirmation difficult.

Differential Diagnosis:

Sarcoidosis, neoplasms, midline granuloma, rhinoscleroma, paracoccidioidomycosis, histoplasmosis, syphilis, and tertiary yaws.

Treatment

Sb^v (20mg/kg/day, IV or IM for 28 days) is moderately effective for mild mucosal disease, whereas advanced disease may not respond to such therapy or may relapse repeatedly.

- Amphoterecin – is the best alternative available
- Patients who develop signs of respiratory compromise during therapy may benefit from concomitant steroid treatment.

3.1.6 Prevention and Control

Intervention strategies for prevention and control are hampered by the presence of many reservoir hosts and multiplicity of sandfly vectors. There are many eco-epidemiological entities each requiring distinct control strategies.

Prevention

Aim of prevention

- Avoiding host infection (Human or canine)
- Preventing subsequent progression to disease

Strategies

- Early diagnosis and treatment
- Prevent intrusion of people in to natural zoonotic foci
- Protect against infective bites of sand flies
- Health education
- Community participation

Individual prevention

- Avoiding risk of Exposure: Avoid vicinity of sandfly development or resting sites
- Mechanical means: self protection form sandfly bite by wearing clothes, bed nets
- Chemical means: repellants applied to the skin

Collective measures

- Forest clearance: establishment of forest free zone of about 400 meter around human settlements
- Indoor residual spraying

Control

Aim of control

- interrupt life cycle of parasite
- limit or eradicate the disease

Targets are the vector and the reservoir

Strategies

Depend on ecology and behavior of the main targets

- Case detection and treatment: when reservoir is man
- Wild reservoir control: when reservoir are rodents , not applicable to other mammals
- Sandfly control

- Destruction of breeding sites
- Insecticide spraying

Other Methods

- (i) Health talks
To individuals, groups and communities.
- (ii) Mass media includes news papers , leaflets radio , television
- (iii) Role plays and dramas
- (vi) Community participation

For successful environmental management

- ❖ mobilize community health workers, community leaders , women, other sector personnel such as in agriculture education , religious leaders etc
- ❖ Train selected community members on Leishmaniasis

Topics for Health Education

1. Under taking Environmental control
 - forest clearance
 - Destroying rodent sites
 - Identifying sandfly breeding sites and destruction of those sites
2. Reduction of contact between people and sandflies
 - Selection of settlement sites , should be at least 400mts away form breeding and shading sites
 - Clearing trees and vegetation around living , working areas
 - Increase use of insecticide impregnated bed nets
 - Use of screen on windows
 - Wearing protective clotting
 - Applying insect repellants on the skin
3. Early reporting to nearest health institution
4. Community participation
 - Importance of community participation and
 - Intersectoral collaboration

5. Traditional healing practices

- Study the traditional treatment & patient care procedures of Leishmaniasis and identify useful and harmful traditional practices.
- Based on the information, discuss the findings with other professionals to substantiate the usefulness of the traditional healing practices. Then an attempt should be made to utilize useful traditional practices with in the health care system.



3.2 SATELLITE MODULE FOR PUBLIC HEALTH NURSES ON LEISHMANIASIS

3.2.1 Introduction

3.2.1.1 Purpose

This satellite module is prepared for public Health Nursing (PHN) with the main purpose of enabling them identify, manage and also refer patient with leishmaniasis in the context of the first referral system. It will also help them participate in the control and prevention program.

3.2.1.2 Directions

To better understand the disease particularly the cause, mode of transmission, incubation period, clinical manifestations, diagnosis, and the available treatments (surgical and medical) the Public Health Nurse is advised to read the core module and then the satellite module.

3.2.2. Learning objectives

At the end of the session the PHN should be able to:

1. List the various assessment considerations (focuses assessment for patient with leishmaniasis)
2. Describe the possible major nursing diagnosis expected from patient with leishmaniasis
3. Describe the nursing care to be given at this level for patient with leishmaniasis
4. Discuss the way how PHN can be involved in control and prevention programs

Pre test

1. One of the following is not reservoir of the species genus Leishmania, which causes leishmaniasis.
 - A. Humans and wild rodents
 - B. Hyraxes and edentates (sloths)
 - C. Marsupials and carnivores

- D. Domestic rodents
 - E. None of the above
2. Visceral leishmaniasis is characterized by
- A. Fever, hepatosplenomegaly
 - B. Lymphadenopathy, anemia
 - C. Progressive emaciation and weakness
 - D. Only B and C
 - E. All of the above
3. Which of the following is true about the treatment of leishmaniasis
- A. Pentavalent antimonials
 - B. Sodium stibo gluconate (pentostam®)
 - C. Cloroamphinicol and PPF
 - D. Amphotericin B (Fungizone®)
 - E. Only A, B and D
4. The mode of transmission for leishmaniasis is through the bite of infected
- A. Female anophilus mosquito
 - B. Tse- Tse fly
 - C. House fly
 - D. Phlebotomine sand flies
 - E. Only A and D
5. The incubation period for leishmaniasis takes
- A. At least a week, up to many months
 - B. From two days up four days
 - C. From two up to twelve hours
 - D. From twelve to twenty four hours
 - E. None of the above

Assessment

The history or subjective data includes

1. Exposure or visit to leishmania endemic area
2. History of bit of sand fly
3. History of wound, especially a persistent wound that took months to heal
4. Place of residence
5. Place of work

Pertaining to the physical examination

For cutaneous and mucocutaneous leishmaniasis

- Skin lesions; multiple or catalytic
- Character of the skin lesion
- Areas involved
- Sign of pruritis:
 - Scratching
 - Excoriations
 - Redness
 - Wheals
- Signs of lesion infection
- Regional lymph adenopathy
- Ulceration and erosion of the nasal septum as well as gingival edema are also common features of the mucocutaneous leishmaniasis that mainly affect the nasal mucosa. It is not significantly prevalent in Ethiopia

For a patient with visceral leishmaniasis, the examination should focus on checking the patient for possible:

- Hepatomegaly
- Fever
- Splenomegally
- Body wasting (weight loss)
- Sign of anemia such as;

- Generalized body weakness
- Fatigue
- General malaise
- Pallor of the skin and mucous membranes
- Anorexia
- Diarrhea (some times)
- Peripheral lymphadenopathy are among the signs and symptoms that a Public Health Nurses may give due attention during assessment of pt with leishmaniasis

During Nursing Assessment a PHN should also need to assess the patient's ability to visit the health center by him self as well as the patient's:

- Financial status
- Available resources that the patient has for hospitalization and
- Since this problem may attack all the family and the local community, the PHN needs to assess all the community, family especially children and also young adults for that they are the risk groups

Common Nursing diagnosis for a patient with Cutaneous Leishmaniasis

1. Altered skin integrity
2. Risk for impaired skin integrity related to changes in the barrier feature of the skin
3. Pain and itching related to the skin lesion
4. Body image disturbance related to the unsightly appearance of the lesion
5. Knowledge deficits about the treatment regimen

Nursing diagnosis for patient with visceral leishmaniasis includes:

1. Activity intolerance related to weakness, fatigue, and general malaise
2. Altered nutrition, less than body requirement related to anorexia

PLANNING AND IMPLEMENTATION

The major goals in the management of a patient with leishmaniasis of all types may include:

- Increased knowledge about the disease, its treatment and prevention
- Maintain tissue and skin integrity and prevention of potential complications
- Maintenance of normal body temperature
- Attainment of adequate nutrition
- Adaptation and adjustment to alteration in body image
- Maintenance of fluid and electrolyte balance
- Absence of pain
- Tolerance of daily activities

3.2.3 INTERVENTIONS

Note. Since the patient with leishmaniasis needs a long course of treatment in the hospital, the patient should be referred to a hospital. But the public health nurse will have a role in treating the patient before referral and also after the patient is discharged from hospital.

NB, since the patient with cutaneous or muco-cutaneous leishmaniasis may have similar clinical features like that of a patient with lepromatous leprosy, the patient needs to be clearly identified.

3.2.3.1 Patient education and health maintenance; care in the Health Center, home, and community

- Increase the participation of the patient in care by making aware of the consequences of infection, goals of planned treatment and patient's role in ongoing care
- Educate patients and families during the course of the health center stay to care for the skin lesion by early active participation.
- Encourage and support, patients and families to handle follow up wound care and handling the patient with other leishmanial symptoms

- Teach the patient, family, and the community from which the patient comes about the disease, its cause, and also the way how it can be prevented.

3.2.3.2 Improving skin integrity and facilitating wound healing

- Assess and document the character of any lesion or any surgical site and drainage
- Use cotton ring to protect the skin lesion from pressure during sleeping or when the patient lies.
- Administer or apply prescribed medication(s) in a timely manner or demonstrate the way how the patient or family should apply the given medication.
- Infected lesions need to be treated with appropriate topical or systemic antimicrobial agents.
- Clean the wound with an antiseptic solution preferably with hydrogen peroxide) (H₂O₂) one or two times a day. It needs no dressing but the patient should be advised to maintain wound cleanliness. Demonstrating to the patient about techniques of washing and wound care is important.
- To avoid potential alteration in the skin integrity as a result of pruritis
 - Tell the patient not to scratch his body to prevent secondary infections.
 - Identify the cause of pruritis and remove the cause
 - Lubricate the skin with an emollient
 - Advise wearing soft cotton garments next to the skin
 - Nail care should be considered in order to avoid self-scratching injury while sleeping.

3.2.3.3 Attaining and Maintaining Adequate Nutrition

- Encourage a well balanced diet high in protein, high calories as well as fruits and vegetables based up on the socio economic status of the patient and locally available foods.
- Teach to avoid spicy (irritating) and gas producing foods
- Plan a dietary teaching session for patient and family.

- Advise about the importance of mouth care and exercise to increase appetite (avoidance of anorexia)

3.2.3.4 Tolerance of Normal activity

For patients that developed severe visceral leishmaniasis and associated anemia the following nursing interventions are to be considered:

- Plan care to conserve strength, physical and emotional energy
- Encourage frequent rest periods
- Elicit family support for a restful environment
- Encourage ambulation and daily activities as tolerated
- Resume activities gradually as blood studies return to normal. Therefore monitor the Hgb or Hct level.
- Encourage conditioning exercises for increased performance
- Tell the patient that his activity intolerance has come from anemia due to the leishmaniasis disease process
- You can test for hemoglobin level (or hematocrit)

3.2.3.5. Absence of Hyperthermia or controlling hyperthermia

- Check the vital signs
- Give the patient antipyretics as needed
- Encourage the patient to increase fluid intake
- Use other physical methods such as:
 - Cold sponging
 - Tipped sponging and
 - Ventilation as need

NB. The fever usually persists till the patient is treated for the disease. Therefore the patient should be informed about it.

3.2.3.6 Absence of pain

- Assess for the presence and character of pain, behavioral responses and factors influencing the pain
- Administer prescribed analgesics as needed and observe for pain relief
- Administer analgesics before potentially painful procedures
- Provide measures to promote rest and sleep; emotional support and reassurance to achieve pain control

3.2.3.7 Improving body image and self esteem

- Reassure the patient with acute CL or MCL that the wound will heal faster if he follows the treatment and show good compliance for the treatment regimen. Information about corrective surgery may be essential to reduce the patient's concern
- Teach the patient to direct attention away from a disfigured body to the self within (if there is scar or loss of nose tissue)
- Refer the patient to support group to meet others with similar experiences and develop coping strategies to deal with loss
- If rehabilitation is needed, coordinate available consultants such as psychologists, social workers, vocational counselors, teachers, and religious leaders

Post test

1. The control measures for leishmaniasis include all except:
 - A. Detect cases systematically and treat rapidly
 - B. Apply insecticides with residual action periodically
 - C. Eliminate rubbish heaps and other breeding places
 - D. All of the above
 - E. None of the above
2. Why is the patient with leishmaniasis referred from health center to the regional hospital? It is because the treatment for leishmaniasis needs
 - A. Leishmaniasis treatment needs hospitalization
 - B. Leishmanial treatment requires longer treatment than possible at the health center
 - C. In case of severe visceral leishmaniasis the patient may need blood transfusions
 - D. The drugs to be given are usually, reserved for hospital use
 - E. All are correct
3. The public health nurse is an ideal person to
 - A. Identify the diseased person and at risk group
 - B. Notify the condition to health center team.
 - C. Provide pre-referral, intra-referral and follow up nursing care
 - D. Teach the community about the disease and its prevention
 - E. All are correct
4. During assessment of high-risk groups in the community the PHN should give due attention
 - A. Older adults
 - B. Young adults
 - C. Children
 - D. B and C are correct
 - E. None of the above

3.3 SATELLITE MODULE FOR MEDICAL LABORATORY TECHNICIANS ON LEISHMANIASIS

3.3.1. Introduction

3.3.1.1. Use and Purpose of the Satellite Module

This satellite module is prepared for medical laboratory technologists with the main purpose of enabling them to perform leishmania diagnosis effectively.

3.3.1.2. Directions

Readers are advised to study the core module before going into the satellite module.

- After completing the satellite module answer all the questions in the post test
- Compare your results with that of the pretest.

3.3.2 Learning objectives

Upon completion of the activities in this module you will be able to: -

- 1) Name the different types of specimens from which leishmania parasites are recovered.
- 2) Name the specific laboratory techniques that help in diagnosing leishmania.
- 3) Know how each specimen is processed and examined
- 4) Differentiate the stages of leishmania parasites

3.3.3 Pretest

1. One of the following morphologic features cannot describe the amastigote stage:
 - A. Round to oval in shape
 - B. Has free flagellum
 - C. Has eccentric nucleus
 - D. Has no undulating membrane

2. _____ is the stage of Leishmania detected from a spleen aspirate
 - A. Promastigote
 - B. Amastigote
 - C. Trypomastigote
 - D. Epimastigote

3. _____ Causes visceral leishmaniasis
 - A. L.aethiopica
 - B. L.Major
 - C. L.donovani
 - D. L.tropica

4. _____ is the stage of leishmania obtained from culture media
 - A. Promastigote
 - B. Amastigote
 - C. Trypomastigote
 - D. Epimastigote

5. Among the following diagnostic tests, one has little value in the diagnosis of cutaneous Leishmaniasis.
 - A. Examining slit skin smears for amastigotes
 - B. Testing leishmania antibodies in serum
 - C. Culturing the material collected from nodule
 - D. None

6. In Formol gel (aldehyde) test, whitening and gelling of serum within 20 minutes indicates a _____
- A. Positive test
 - B. Negative test
7. Among the following tests one is non-specific for the diagnosis of VL
- A. ELISA
 - B. IFAT
 - C. DAT
 - D. Formal gel test
8. One is not true when using Giemsa staining technique
- A. The stock should be diluted 1:10 to stain the smear
 - B. Diluted Giemsa staining solution can be used for longer than 24 hours
 - C. The pH of the solution should be 7-7.3
 - D. Buffered saline can be used to dilute the stock stain
9. Among the following samples, one is best for the diagnosis of cutaneous leishmaniasis
- A. Spleen aspirate
 - B. Bone marrow aspirate
 - C. Buffy coat smear
 - D. Slit skin smear
10. Identify a species that is not relevant to Ethiopia:
- A. L. Donovanii
 - B. L. aethiopia,
 - C. L. major
 - D. L. mexicana

3.3.4 Laboratory Diagnosis of Leishmaniasis

Leishmaniasis can be diagnosed in the laboratory by:

- A. Hematological investigations
- B. Parasitological examination
- C. Serological diagnosis

3.3.4.1 Diagnosis of Visceral Leishmaniasis (VL)

The laboratory diagnosis of visceral leishmaniasis is based on

(A) Hematological investigations

In VL, blood cell production becomes depressed and white cells, platelets, and red blood cells become sequestered in the spleen. Patients become anemic, leucopenic, and thrombocytopenic. During treatment, a rising hemoglobin and white blood cell count indicate a good response.

The investigations include:

- Measurement of the hemoglobin (decreased value).
- White blood cell count (decreased count).
- Platelet count (decreased count).
- Erythrocyte sedimentation rate (raises due to increase in globulins)

(B) Parasitological examination

- Parasite can be demonstrated following staining and /or culture technique.

Staining techniques for smears

There are two staining techniques:

1. Giemsa's staining technique
2. Field's staining technique

Procedure for Giemsa staining technique:

1. Prepare 1: 10 diluted Giemsa stain solution by taking one part stock Giemsa stain and nine part buffered saline solution (pH 7.2) and use with in 8 hours
2. Fix the smear in methanol for 1-2 minutes
3. Cover the smear with the diluted stain for 20 minutes
4. Rinse the slides in tap water
5. Allow the slide to dry on end in draining rack

Procedure for Field staining technique:

1. Fix the smear in methanol for 1-2 minutes
2. Dip the slide three times in to a container of Field stain B
3. Wash the slide in a container of clean water
4. Dip the slide three times in to a container of Field stain A
5. Wash well with clean water
6. Allow the slide to dry on end in draining rack

I. Examination of the sample for amastigotes

- The amastigote stage of leishmania species that cause VL lives intracellularly in the macrophage of reticuloendothelial system.
- They can therefore be found in:
 - Liver aspirates
 - Spleen aspirates
 - Bone marrow aspirates
 - Lymph node aspirates
 - The buffy coat layer

1. Examination of Aspirates

Laboratory staff assist the medical officer performing the aspiration to ensure films of the correct thickness are made.

Note: a splenic aspiration must not be performed without training and experience because it may lead to fatal hemorrhage if done incorrectly.

Procedure for examining aspirates

1. Immediately after aspiration, make at least 2 thinly spread smears of the aspirate on clean slides. Only a small quantity of aspirate is required. Dilution with blood should be avoided.
2. Air-dry and then fix each smear, by immersing the slides in a container of methanol for 2- minutes
3. Stain the smears by the rapid Field's or Giemsa staining technique for thin films.
4. When the smear is dry, spread a drop of immersion oil on it and examine first with the 10x and 40x objectives to detect macrophages, which may contain amastigotes (the parasites can also be found outside macrophage cells). Use the 100x oil immersion objective to identify the amastigotes.

2. Examination of Buffy Coat Smear

The amastigotes can be found in the peripheral blood monocytes and less commonly in neutrophils. It can be and detected in stained buffy coat smears prepared from EDTA (sequestrene) anticoagulated venous blood.

Note: When collecting the EDTA venous blood sample, also collect sufficient venous blood for the hematological and formol gel screening test.

Procedure for examining buffy coat smear

1. Collect about 7 ml of venous blood. Dispense about 2 ml into an EDTA container and mix gently. Dispense the remainder into a dry glass tube (to provide serum for the formol gel test).

2. Using Pasteur pipette, aspirate the blood from the EDTA container
3. Insert the tip of the pipette to the bottom of narrow bore tube (e.g. Eppendorf plastic tubes or glass tube 6x50 mm;) and fill the tube with blood, withdrawing the pipette as the tube fills.
4. Centrifuge the EDTA blood in tubes for 15 minutes at about 1000 gravitational force.
5. Using Pasteur pipette, carefully remove and discard the plasma above the buffy coat.
6. Transfer a drop of the buffy coat on slide and spread to make a thin smear.
7. Air-dry the smear and fix it with methanol for 2 minutes
8. Stain the smear by Giemsa technique or Field's rapid technique for thin films
9. When the smear is dry, spread a drop of immersion oil on it and examine first with the 10x and 40x objectives to detect macrophages, which may contain amastigotes (the parasites can also be found outside macrophage cells). Use the 100x oil immersion objective to identify the amastigotes.

II. Culturing

If culturing facilities are available, aseptically dispense any aspirate or blood into sterile culture medium (NNN media) and examine for promastigotes.

C) Serological diagnosis

- In visceral leishmaniasis, specific antibodies as well as non-specific polyclonal IgG and IgM are produced.
- Several techniques have been developed to detect and measure specific anti-leishmanial antibodies in patients' sera. One of these methods is Rapid latex agglutination test

Rapid latex agglutination test

- The latex test is quicker and easier to perform.
- Equal volumes of test serum and sensitized dyed latex particles are mixed on a cavity microscope slide and rotated for up to 2 minutes.
- A positive test is shown by agglutination reaction

Note: sera from VL patients co infected with HIV may be (but not always) non-reactive in sero-diagnostic tests, including the DAT and latex agglutination test.

D. Other test

Formol gel (aldehyde) Test

- It is simple and inexpensive,
- The test is non-specific, which detects marked increases in IgG.

Procedure

1. Collect about 5 ml of venous blood in a dry glass tube and leave to clot.
2. When the clot begins to retract (30-60 minutes after collection) centrifuge the blood to obtain clear serum. If a centrifuge is not available, leave the specimen to separate overnight.
3. Transfer about 1 ml of red cell free serum to a small tube.
4. Add 2 drops of 40% formaldehyde solution and mix.
5. Allow to stand for up to 2 hours. Most positive tests, however, can be read after a few minutes.

Interpretation

Positive test: serum whitens and gels usually within 20 minutes (often within 5 minutes).

Note: In early infections, whitening and gelling of the serum may take up to 2 hours

Negative test: serum remains unchanged or gelling only occurs within 2 hours. A negative test cannot exclude VL (test only becomes positive about 3 months after infection)

Note

- Patients with multiple myeloma may give a positive formol gel test.
- Raised IgG levels (but not usually as raised as to give a positive formol gel test) are also found in other conditions such as:
 - Chronic liver disease,
 - Leishmaniasis,
 - Trypanosomiasis
 - Leprosy
 - Pulmonary tuberculosis
- The formol gel test may be negative in conditions such as:
 - Typhoid fever
 - Hemolytic anaemia
 - Chronic myeloid leukaemia
 - Infective endocarditis
- Variable results are found in VL patients infected with HIV

3.3.4.2 Diagnosis of Cutaneous (CL) and Mucocutaneous Leishmaniasis (MCL)

The laboratory diagnosis of CL and MCL is by:

A. Parasitological examination

- I. Detecting amastigotes in smear taken from infected ulcers or nodules.
- II. Culturing ulcer material and examining culture for promastigotes.

I. Examination of slit skin smears for amastigotes

Material for examination should be taken from the inflamed swollen edge of an ulcer or nodule not from its base or center, which usually contains only necrotic tissue. Care should be taken to avoid contaminating the specimen with blood.

Note: Secondary bacterial contamination makes it difficult to find parasites and therefore if bacterial infection is present, examination for Leishmania amastigotes is best delayed

until anti-microbial treatment has been completed and the bacterial infection has cleared.

Procedure

1. Cleanse the area with a swab soaked in 70% alcohol. Allow to dry completely
2. Firmly squeeze the edge of the lesion between the finger and thumb to drain the area of blood (protective rubber gloves should be worn).
3. Using a sterile blade, make a small cut into the dermis and blot away any blood.
4. Rotate the scalpel through 90⁰ and with the cutting edge of the blade scrape the cut surface in an outward direction to obtain tissue juice and cells.
5. Apply a sterile dressing to the cut surface and maintain pressure until bleeding stops.
6. Spread the material on a clean slide using a circular motion and working outwards to avoid damaging parasites in those parts of the smear that have started to dry

The smear must be thinly spread and not left as a thick 'dab' smear. A Parasite will be difficult to find in thick smears.

7. When dry, fix the smear for 2-3 minutes by covering it with a few drops of absolute methanol (methyl alcohol).
8. Stain the smear using the Giemsa technique or rapid Field's technique for thin films.
9. When the smear is dry, spread a drop of immersion oil on it and examine first with the 10x and 40x objectives to detect macrophages, which may contain amastigotes (the parasites can also be found outside macrophage cells). Use the 100x oil immersion objective to identify the amastigotes.

II. Culture of ulcer material

Culture is of value when cutaneous leishmaniasis is suspected and parasites cannot be found in smears.

C. Serological diagnosis

Serology has little value in diagnosis of CL, as antibody response is poor. There is, however, a cellular response, which is the basis of the Leishmanin skin test. In MCL, antibodies can be found in the serum.

Leishmanin test

In the test, 0.1 ml of well-shaken antigen is injected intradermally into the inner surface of the forearm.

A Control solution of 0.5 % phenol saline should be injected at a neighboring site at the same time. The diameter of induration is measured at 48 and 72 hours.

Interpretation

Positive reaction

The reaction is considered positive when the area of induration is 5 mm in diameter or more.

A positive reaction may be found in many persons from endemic areas who show no visible skin lesions but have been exposed to infection (test remains positive for life). A positive leishmanin test in children under 1 years of age from endemic areas is highly suggestive of the disease.

In persons entering an endemic area for the first time, the development of skin lesions and positive leishmanin test indicate cutaneous leishmaniasis.

Negative reaction

The reaction is considered negative when the area of induration is less than 5 mm in diameter.

- A negative reaction may be found in some 15% patients with uncomplicated cutaneous leishmaniasis, especially in patients infected with *L. aethiopica*.
- The test is usually negative in active visceral leishmaniasis and diffuse cutaneous leishmaniasis.
- There are no significant cross- reactions with other disease.

3.3.5. Stages of Leishmania Parasite

Leishmania has two developmental stages

- A. Amastigote stage - found in definitive host. Also known as Leishman Donovan body
- B. Promastigote stage - found in the intermediate host and culture media

3.3.6. Identification features for the stages of Leishmania parasite

A. Amastigote stage

- Small, round to oval bodies measuring 2-4 μ m.
- Has no free flagellum
- Has no undulating membrane
- Can be seen in groups inside blood monocytes (less commonly in neutrophils), in macrophages, or lying free between cells.
- The nucleus and rod shaped kinetoplast in each amastigote stain dark reddish- mauve.
- The cytoplasm stains palely and is often difficult to see when the amastigotes are in groups

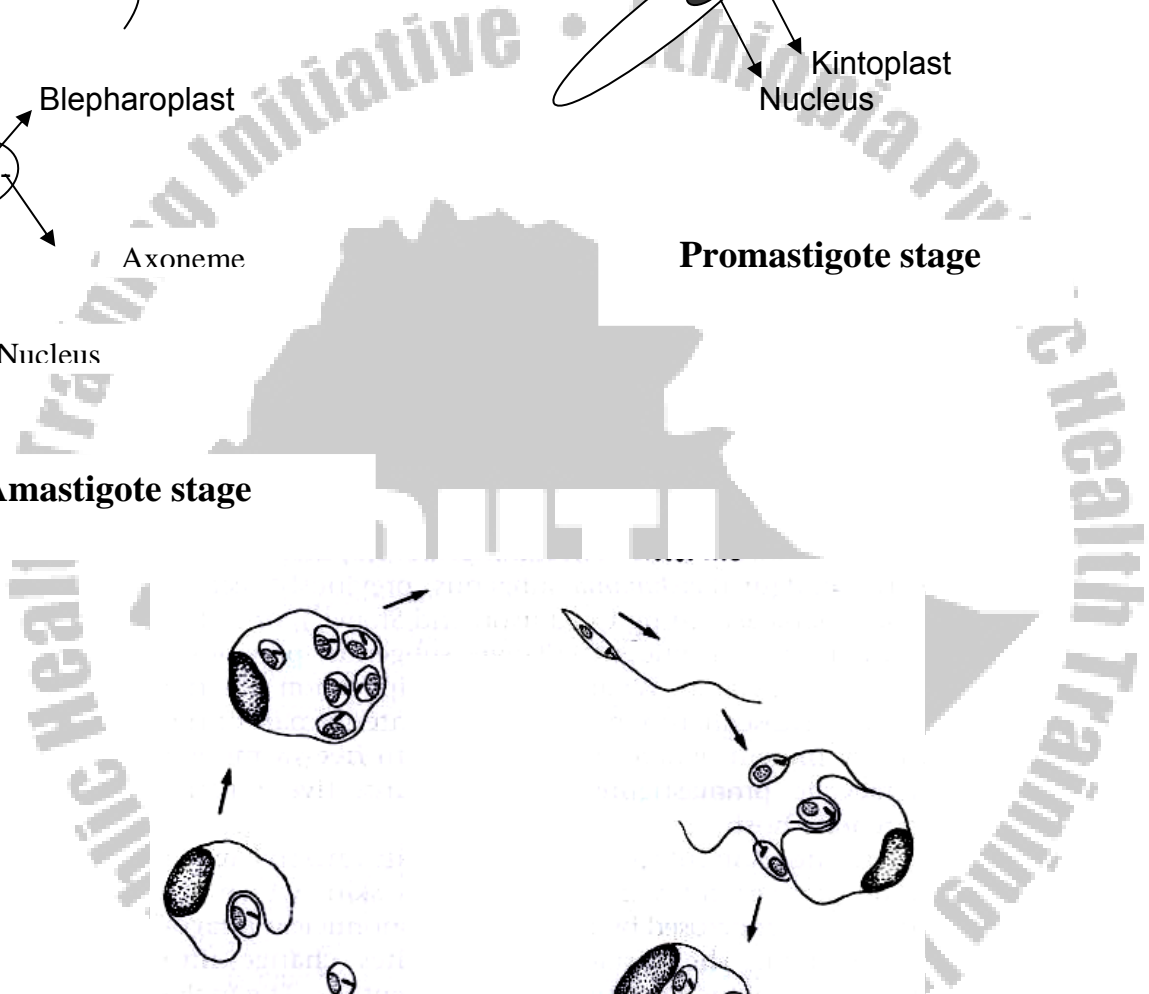
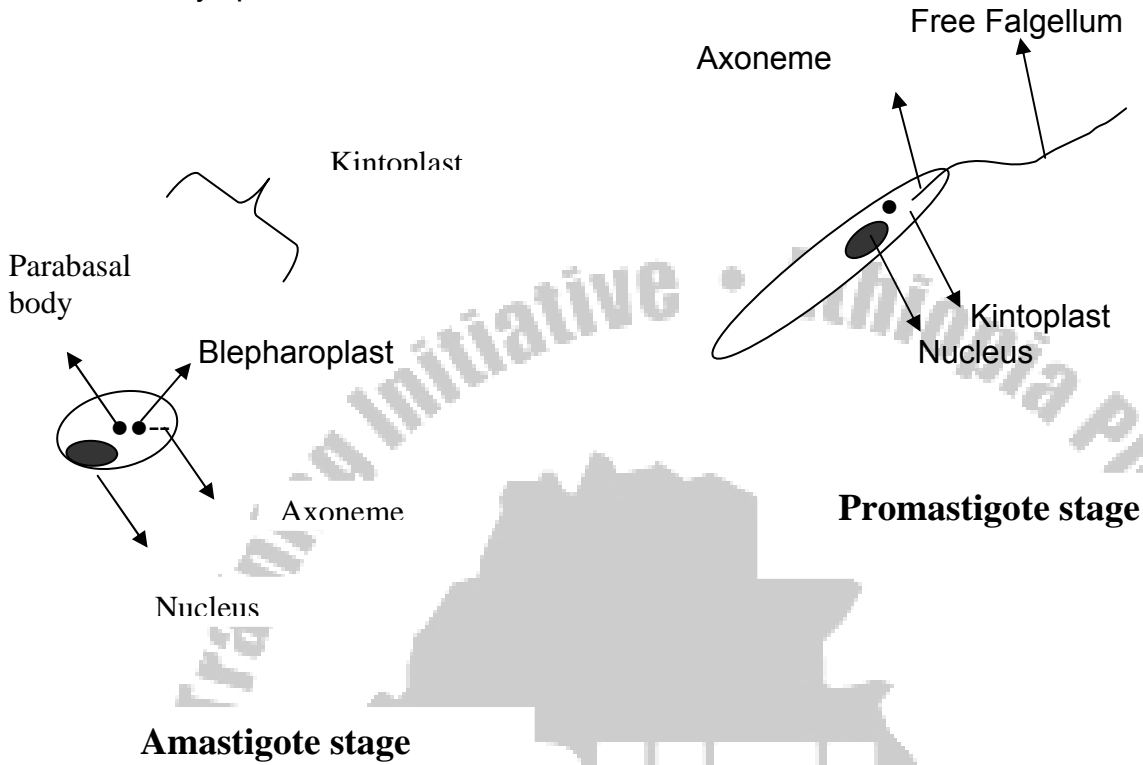
Promastigote stage

- Elongated in form
- Has single free flagellum
- Has no undulating membrane
- Nucleus is near the middle
- The kinetoplast is in the anterior portion

Note:

- Distinguishing leishmania species based on morphological criteria at the light microscope is very difficult and quite often geographical and clinical criteria are used to assist in identifying species.
- How ever there are some variations in size between species. For instance, *L.mexicana* amastigotes are larger than those of *L. braziliensis* and have a more centrally placed kinetoplast.

Alternatively immunological, molecular or biochemical criteria are needed to positively identify species.



Picture showing promastigote and amastigote stages of Leishmania parasite.

3.3.7 Post test

Do the pretest as posttest to assess how much you have gained

3.4 SATELLITE MODULE FOR ENVIRONMENTAL HEALTH OFFICERS ON LEISHMANIASIS

3.4.1. Introduction

3.4.1.1 Purpose and Use of Satellite Module

This satellite module is prepared for Environmental Health Technicians to enable them to focus on the effective prevention and control of leishmaniasis.

3.4.1.2 Directions

- Study the satellite module after going through the core module.
- Environmental health officers are advised to refer to the core module whenever indicated.
- Before & after completing the satellite module answer all the questions under pre-test and post-test respectively.
- Compare your results with the previous performance.

3.4.2 Learning Objectives

Upon completion of this satellite module you will be able to:

- Identify the potential sandfly breeding sites.
- Identify potential leishmania endemic areas and implement surveillance program.
- Identify the preventive and control measures of leishmania.
- List the intervention activities at different levels of health care.
- Identify the developmental stages of sandfly.
- State the methods of health education for action.
- Identify the external morphology of adult phlebotomine sand fly.

3.4.3 Pretest

Instruction – choose the best answer

- 13) Why insecticidal control of sand fly larvae remains impossible?
- A. The breeding sites of most species are unknown or secretive
 - B. Even when the breeding sites are identified, they are too diverse and impractical to reduce larval number
 - C. Their larvae float on water surface and hide themselves
 - D. A and B
- 14) Which of the following **is not** true about the external morphology of phlebotomus sandflies
- A. The palps are as long as the proboscis
 - B. Hairy appearance
 - C. Have long and stilt like legs
 - D. Their wing held erect over
- 15) The eggs of sand fly are deposited:
- A. On surface water
 - B. On cracks and holes in the ground
 - C. On floating substance of water
 - D. All
- 16) Maturation of larva of phlebotomine sand fly depends on the following **except**
- A. Temperature
 - B. Food supply
 - C. Water flow
 - D. Species
- 17) Phlebotomine sand fly have a relatively short flight range, so that it is easy to control by-----
- A. Insecticidal spraying
 - B. Protective clothes
 - C. Impregnated bed net
 - D. Repellants

- 18) Under which of the following methods phlebotomine sand fly can be effectively prevented?
- A. By destroying reservoir
 - B. By forest clearance
 - C. By applying insecticides
 - D. All
- 19) Which of the following is impractical method of prevention of leishmaniasis?
- A. Environmental management
 - B. Destroy the reservoirs
 - C. Personal protection
 - D. Applying insecticide
- 20) Which of the following **is not** a characteristics of phlebotomine sand fly
- A. Active during night and dusk
 - B. Rest in dark moist areas
 - C. Active only during the day
 - D. endophilic and exophilic
- 21) Which of the following is a protective method against leishmaniasis at individual level?
- A. Reducing breeding sites
 - B. Applying insecticides
 - C. Using repellants
 - D. Forest clearance
- 22) The epidemiology of leishmaniasis is largely determined by:
- A. The species of sand flies, their ecology and behavior
 - B. The availability of the wide range of hosts
 - C. The species and strains of leishmania parasites
 - D. All
- 23) "Forest – free- belt" means:
- A. Afforestation
 - B. Forest clearance
 - C. Kill wild reservoirs
 - D. Filling cracks or burrows

24) Old World leishmaniasis is transmitted by:

- A. Phlebotomus species
- B. Lutzomia species
- C. Anopheles species
- D. Culex species

3.4.4 Epidemiology

Leishmaniasis is a parasitic disease transmitted through the infective bite of an insect vector, the phlebotomine sand fly. The reservoir hosts are various species of mammals which are responsible for the long-term maintenance of leishmania in nature.

Leishmaniasis currently threatens 350 million men, women and children in 88 countries on four continents.

The genus phlebotomus and lutzomia are widely distributed in the tropics and subtropics. Phlebotomus species occur in Old World tropics, most of them inhabit semiarid savanna areas in preference to forested areas. Lutzomia occurs in the New World mostly in the forested areas of Central and South America.

3.4.5 Adult Behavior

The adult sand flies are weak fliers and usually stay within a few hundred meters of their breeding places. They fly in a characteristic hopping way, with many short flights and landings. As a result, biting is restricted to areas where suitable breeding sites occur. Most biting occurs outdoors but a few species also feed indoors. Most species are active at dawn and dusk and during the night, but in forests and dark rooms they may also attack in the daytime, especially if disturbed by human activities. Because of their short mouth parts they cannot bite through clothing. They usually rest in the daytime in sheltered, dark and humid sites, such as those used for breeding, but also in tree holes, caves, houses and stables; other resting places near houses are crevices in walls, stacks of firewood, bricks and rubbish.

Sand flies feed on plant juices but for the most part the females need a blood-meal in order to develop eggs. Blood is taken from humans and animals such as dogs, farm livestock, wild rodents, snakes, lizards and birds. Each sand fly species has specific preferences for its source of blood, but the availability of hosts is an important factor. The saliva of sandflies can enhance the virulence of inoculated *Leishmania*. Sandfly species are only important as vectors of leishmaniasis if they feed regularly on humans.

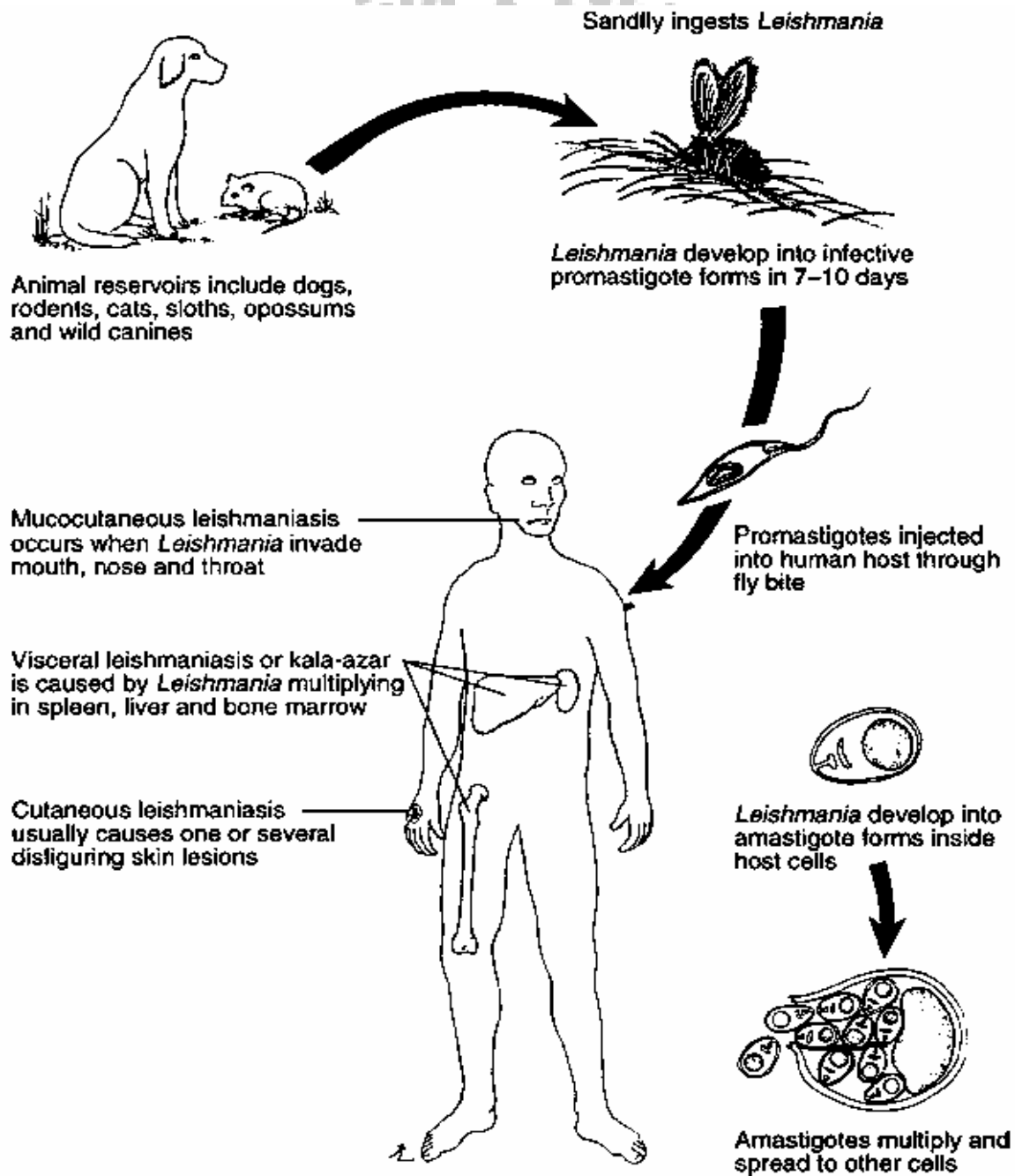


Fig. 1 Life cycle of leishmaniasis

3.4.5.1 External morphology of adult phlebotomine sand flies

⇒ Adult phlebotomine sand fly can readily be recognized by their:

- minute size (2-4mm in length)
- hairy appearance on the body (i.e the head, thorax, abdomen and wings are densely covered with long hairs)
- relatively long and stilt like legs
- relatively large black eyes
- wings to be held erect over the body even when the fly is at rest
- short and inconspicuous mouth parts
- short, hopping flight style



Fig.2. External morphology of phlebotomus sandfly

3.4.5.2 Stages of sandfly development

- **The egg stage:** The eggs are deposited in small cracks and holes in the ground, at the base of termite mound, cracks in masonry, on stable floors, in poultry houses, among leaf litter on the floor.

Although eggs are not laid in water they require a moist microhabitat with a high humidity. They are unable to withstand desiccation and hatch after 6-17 days under optimal conditions but may be prolonged in cooler weather.

- **The larval stage:** The larvae are mainly scavengers, feeding on organic matter such as animal feces, fungi, insect debris, decaying plant materials. Larval development is completed within 19-60 days depending on species, temperature and availability of food.
- **The pupa stage:** Prior to pupation the larva assumes an erect position in the habitat, the skin then splits open and the pupa wriggles out. The larva skin is not completely attached to the pupa.
- **The adult stage:** The adult emerge from the pupa after about 14 days then flies.

The life cycle may last from 1 to 4 months, depending of species and temperature, although it usually lasts less than 45 days.

3.4.6 Prevention and Control Measures

1. At patient level

- Active case detection
- early treatment of cases

2. Basic sanitation

- Waste management /garbage clearance/ and house improvement /by cementing and plastering/
- Reducing breeding sites/places/ by filling any cracks, holes or burrows in the ground.
- Forest clearance, bushes around houses 300-400 meters in width.

3. Control animal reservoir hosts

Focus on destroying wild and domestic reservoir animals.

- Dogs are reservoirs for many species of leishmania, control by destroying infected dogs.
- Eliminating rock hyrax which is a wild animal reservoir in Ethiopia.
- Destroy rodent reservoirs like the great gerbil

4. Personal Protection

- Using fin-mesh bed nets or impregnated bed nets with various insecticides, including pyrethroid permethrin ($300\text{mg}/\text{m}^3$) or deltamethrin ($15\text{-}25\text{mg}/\text{m}^3$)
- Using chemical repellents like trimethyl pentadiol
- Protective clothing for outdoor exposure is successful when treated with insecticides
- Using mesh screen
- In dense forests it is recommended not to stand between buttress roots of large trees.

5. Insecticide Application

- Endophilic vectors can be effectively controlled by spraying the inside surface of walls, the interior of door ways, windows and other openings with residual insecticides such as DDT(1 or 2 gms/ m^2), HCH, Malathion, Fenitrothion, propoxur, or pyrethroids.
- If out side resting sites are known (eg. animal burrows, stone walls, tree trunks...etc) applying residual insecticides have drastic reduction.
- In the case of epidemic outbreaks ultra-low-volume insecticide space-spraying in and around houses is worthy of consideration.

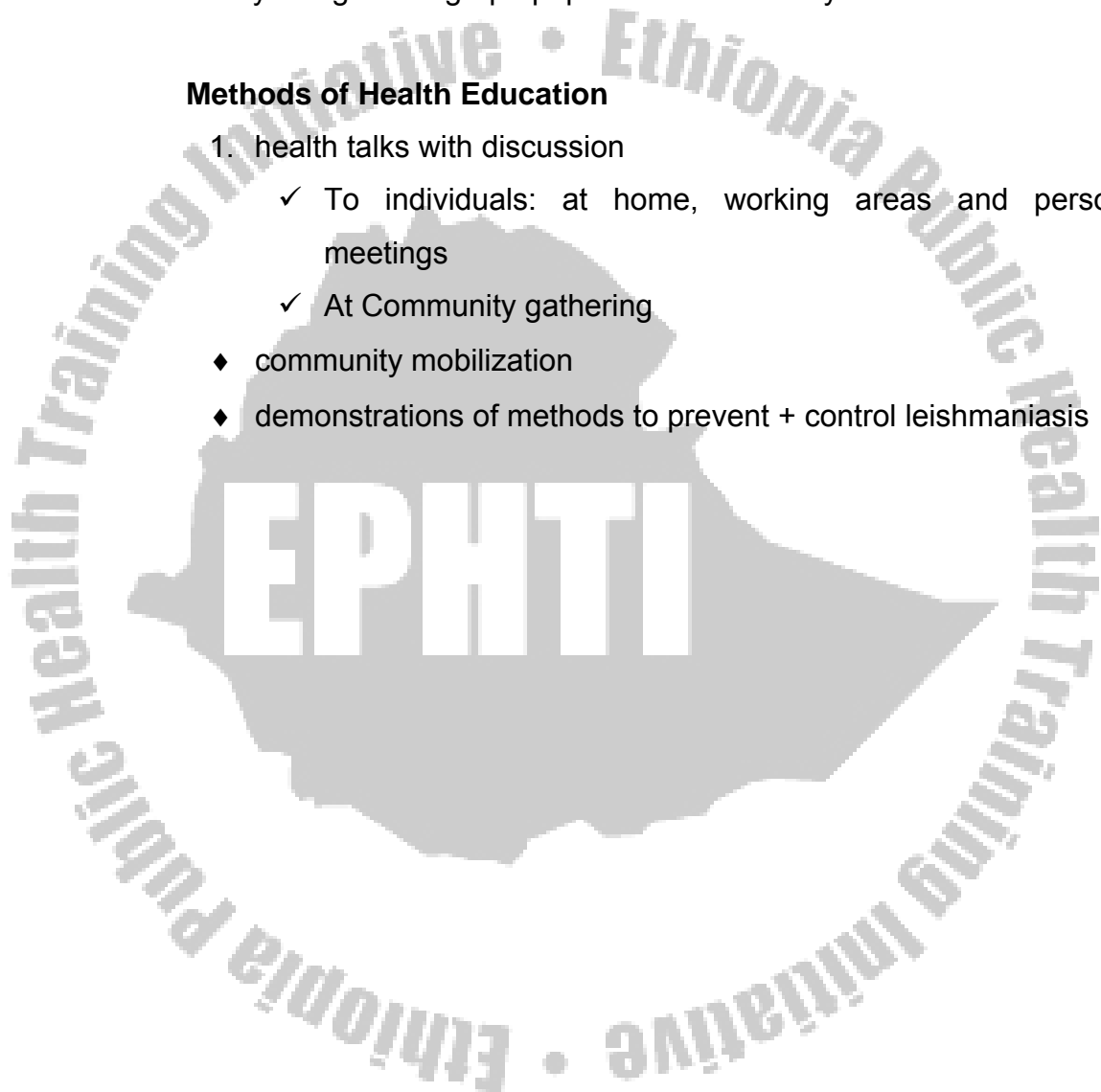
6. Health education

- Increase the community awareness/knowledge about:
 - Personal protection methods from sandfly biting.
Eg.- sandfly repellent
 - wearing protective clothing
 - using impregnated bed net
 - Housing protective methods from the vector.
Eg.-spraying indoor insecticide
 - screening of openings
 - How to eliminate breeding sites and reservoirs of the vector
Eg. -Improve housing condition (plastering and cementing)
 - garbage clearance

- destroy animal reservoirs (dogs, rodents)
- Community mobilization for environmental protection
 - Eg. -forest clearance around houses
 - destroy animal reservoir and its burrows
- Demonstration
 - By using board/graph papers draw the life cycle of the vector.

Methods of Health Education

1. health talks with discussion
 - ✓ To individuals: at home, working areas and personal meetings
 - ✓ At Community gathering
 - ◆ community mobilization
 - ◆ demonstrations of methods to prevent + control leishmaniasis



3.5 Satellite module for health service extension workers

Introduction

Purpose and uses of the module

This satellite module, which is an extension of the core module on Leishmaniasis, is intended to consider important issues that can help the community health workers (CHWs), especially in the prevention and control of Leishmaniasis.

Leishmaniasis is communicable disease that affects a considerable proportion of our society indifferent parts of the country. Prevention and controlling mechanisms have to be strengthened at the community level to decrease illness and death.

As a health agent of the community, your knowledge on Leishmaniasis will help to control the disease and save lives. That is why this short and precise satellite module is prepared for you to teach and work with community in the control and prevention of Leishmaniasis.

Direction for using the satellite module

- ❖ Try to study and answer all the questions in the pretest
- ❖ Read and understand the learning activity (Case study) and answer the questions that follow
- ❖ Read and understand the satellite module
- ❖ Compare your results using the keys after finishing the module

Pretest

1. Leishmaniasis is caused by
 - a. Hereditary problem
 - b. Germs
 - c. Evil eye
 - d. Bad water
2. Leishmaniasis is transmitted by
 - a. Fleas
 - b. Lice
 - c. Sand fly
 - d. Dirty water
3. A person with Leishmaniasis can have
 - a. Skin Problem
 - b. Abdominal swelling
 - c. Fever
 - d. All
4. What preventive measures can you take, in a community where you live, to protect the society from acquiring Leishmaniasis?
5. What will you do if you get a person with a skin lesion, which is long standing, and non- healing?
6. If you are living in Leishmania endemic area what will you teach the society in your health education?

Learning objectives

After completing this satellite module the CHW is expected to:

- Identify the causes of the disease the transmitting vector and reservoir hosts
- Identify individuals suffering from Leishmaniasis

- Describe the contributions of CHWs in the prevention and control of the disease at community level

Case study; Learning activity

Derege is an eleven-year-old boy who lives in Humera with his family. He, one day, became febrile and weak. He complained about his current feelings to his mother and was reassured. In the following days he continued to have same problems coupled with loss of appetite. The family was worried and they had to give him herbal drugs made from local plants and they were arranging coffee ceremonies and performing some rituals.

As time goes by, he lost significant amount of weight and they noticed increment in his abdominal girth. He also had his facial complexion changing gray and dark. They took him to a local healer and the local healer, after examining the distended abdomen and noticing his thin and slim body with his gray face, told his parents that their son is suffering from 'Megagna' caused by 'evil eye' and ordered them to do some sacrifices. The boy continued to have the fever and to lose weight and he was almost bone and skin after several weeks with different local healers prescribing different kinds of herbal medications and sacrifices.

He was finally bed ridden and with huge abdomen, cough, bleeding from the mouth and nose. Some of the neighbors urged the father to take Derege to the near by Health center, and the father took him after a lot of resistance and reluctance.

Questions

1. What do you think the disease was?
2. Do you think 'evil eye' can cause Leishmaniasis?
3. Is there any other disease, you know, giving similar features?
4. Do herbal medications and sacrifices help such patients?
5. What would you advise the father if you were there?
6. What measures would you take to help Derege?

Short notes

1 Definition

Leishmaniasis is a parasitic disease transmitted by a bite of an insect vector.

2 Areas affected

In Ethiopia, low lands along the western borders of the country, Eastern borders and portions of central Ethiopia harbor the disease. People living in these areas of the country have been suffering from the effects of the disease for a long period of time.

Most affected population group

Young children in endemic areas, People who are going to endemic areas in search of work, refugees and displaced people encroaching to endemic areas are at a higher risk of developing the disease.

Cause

Leishmaniasis is caused by germs, which are transmitted by the bite of an insect vector, which harbors the causative agent.

Vector

The vector is an insect fly, which are minute in size (2-4mm) with hairy appearance, long legs, black eyes, and erect wings over their body. They usually rest in sheltered, dark, and humid sites, tree holes, caves, burrows and rubbishes.

They are active during the night and most biting occurs outdoors but a few species bite indoors.

Reservoir

Most Leishmaniasis is contracted from animals, which harbor the parasites. It is from this reservoir that the vector brings the parasite to human beings. The reservoir hosts are rodents, hyraxes, dogs and other game animals, and in rare case human beings are found to be reservoirs.

Symptoms and signs

Leishmaniasis is a disease that can appear in two forms in our country. These forms of the disease are known as Visceral, and Cutaneous. The signs and the symptoms seen in these special forms are different.

3 Visceral Leishmaniasis

The illness starts 2-6 months after the sand fly bit, which transmits the disease.

It starts gradually with fever, which loss of appetite and with progressive weight loss.

The patient will develop significant weight loss and anemia associated with progressive increment in the size of abdomen, which is due to enlargement of abdominal organs, which are liver and spleen. He can also have diarrhea and dry cough and even bleeding from nose or mouth. Due to the commonly prevailing problem patients usually develop pale and grayish facial complexion.

Cutaneous Leishmaniasis

The bite of the sand fly can cause localized irritation and as a result the individual can have skin lesions, which are small, red swellings at exposed parts of our body like face, hands, forearms and lower limbs. They can be ulcerative or dry with nodules covered by scales. These lesions can be localized at a single part or can be disseminated to several parts of the skin. They are not usually self-healing and the individual only complains of their disfiguring results.

Out come of the disease

Out come depends on the type of the disease. Cutaneous leishmaniasis usually results in sine damage and disfigurement otherwise it doesn't cause death. Visceral leishmaniasis unless it is treated on time it will complicate and results in death of a significant percentage of such patients.

Diagnosis

Knowing the symptoms of leishmaniasis is important for diagnosis of both forms of the disease. Final diagnosis needs laboratory confirmation. In visceral leishmaniasis aspirated fluid from the spleen or bone marrow is important to visualize the parasites .for cutaneous leishmaniasis also we need to take tissue from the lesion site and look for the parasites.

Role of the health extension package agent

Referral

A patient with suspected leishmaniasis showing the symptoms described above should be referred to a near by Health centre for further investigation and management. So the agent is required to assess the patient and make sure the patient is referred and gets better medical attention.

Prevention and control

Prevention

Strategies

- Early diagnosis and treatment
- Prevent intrusion of people in to natural zoonotic foci
- Protect against infective bites of sand flies
- Health education
- Community participation

Individual prevention

- Avoiding risk of Exposure: Avoid vicinity of sand fly development or resting sites
- Mechanical means: self protection form sand fly bite by wearing clothes, bed nets
- Chemical means: repellants applied to the skin

Collective measures

- Forest clearance: establishment of forest free zone of about 400 meter around human settlements
- Indoor residual spraying

Control

Aim of control

- interrupt life cycle of parasite
- limit or eradicate the disease

Targets are the vector and the reservoir

Strategies

- Wild reservoir control: when reservoir are rodents , not applicable to other mammals
- Sandfly control
 - Destruction of breeding sites
 - Insecticide spraying
- ❖ mobilize community health workers, community leaders , women, other sector personnel such as in agriculture education , religious leaders etc
- ❖ Train selected community members on Leishmaniasis

Topics for Health Education

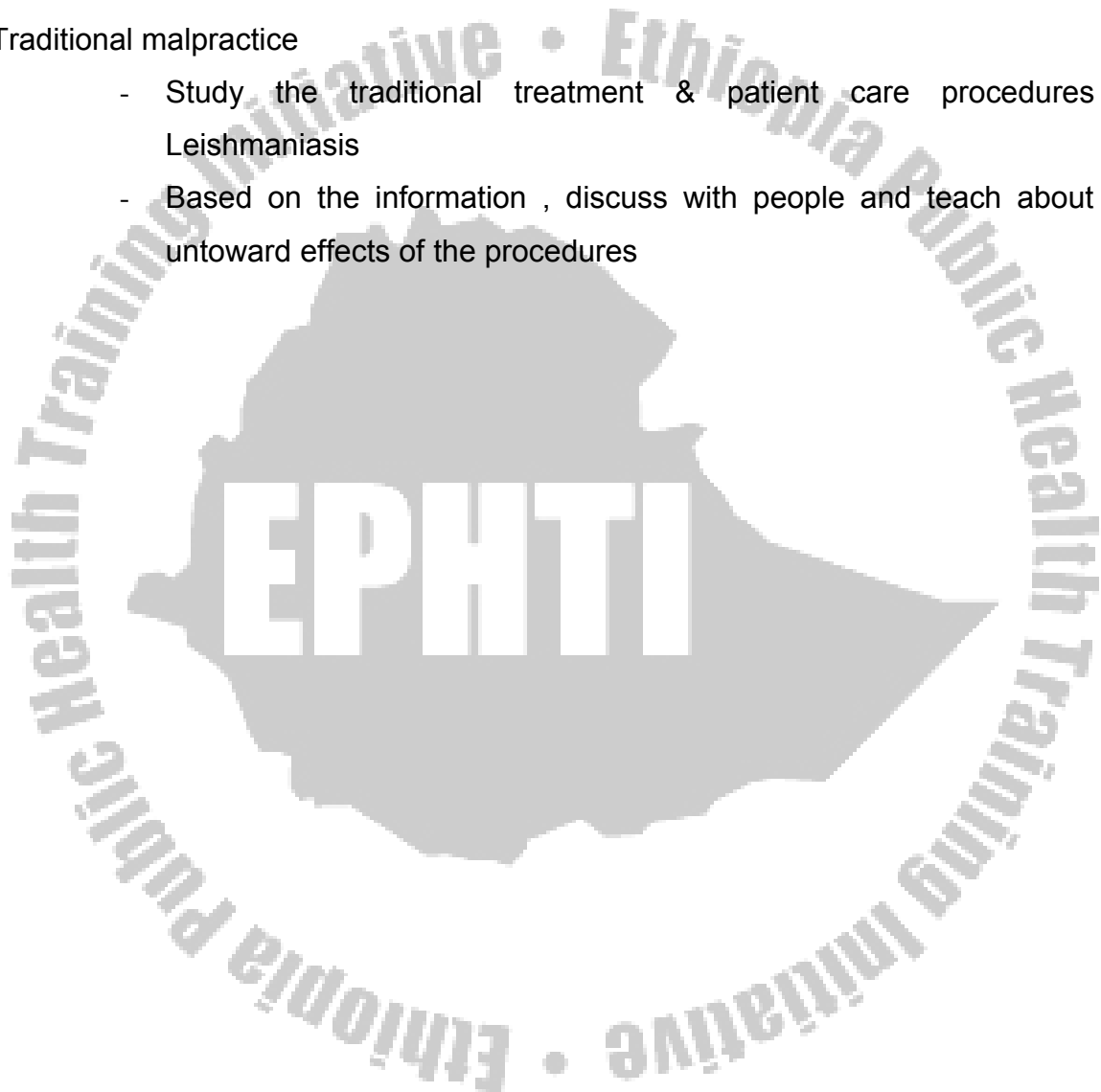
1. Under taking Environmental control

- forest clearance
- Destroying rodent sites
- Identifying sand fly breeding sites and destruction of those sites

2. Reduction of contact between people and sand flies

- Selection of settlement sites , should be at least 400mts away form breeding and shading sites
- Clearing trees and vegetation around living , working areas
- Increase use of insecticide impregnated bed nets
- Use of screen on windows

- Wearing protective clotting
 - Applying insect repellants on the skin
3. Early reporting to nearest health institution
4. Community participation
- Importance of community participation and
 - Inter-sectoral collaboration
5. Traditional malpractice
- Study the traditional treatment & patient care procedures of Leishmaniasis
 - Based on the information , discuss with people and teach about the untoward effects of the procedures



UNIT FOUR

ROLE AND TASK ANALYSIS

Table1: Knowledge-Objectives and Activities by Category of Health Professionals

Learning Objective	Activities			
	H.O	BSc Nurses.	EHO	MLT
Describe the causes of Leishmaniasis	Study the causes of Leishmaniasis	Study the causes of Leishmaniasis	Study the causes of Leishmaniasis	Study the causes of Leishmaniasis
Describe the modes of transmission of Leishmaniasis	Study the modes of transmission	Study the modes of transmissions	Study the modes of transmission	Study the modes of transmission
Describe the life cycle of Leishmaniasis	Study the life cycle in definitive and intermediate hosts	Study the life cycle in definitive and intermediate hosts	Study the life cycle in definitive and intermediate hosts	Study the life cycle in definitive and intermediate hosts
State the diagnostic approach	Study the epidemiological pattern, the clinical features and laboratory methods of investigations	Study the epidemiological pattern, the clinical features & laboratory methods of investigations	Study the epidemiological pattern Environmental factors	Study the laboratory procedures and interpretation of results
Describe the recommended treatment protocol	<ul style="list-style-type: none"> - Study the type, dose and routes of administration of drugs used for treatment of Leishmaniasis - Study the supportive measures for admitted patients - Study about side-effects of drugs 	<ul style="list-style-type: none"> - Study the types, dose and routes of administration of drugs used for treatment of Leishmaniasis - Study side effects of drugs - Study about supportive measures 	Study the types & side effects of anti-Leishmania drugs	-study the types and dose of drugs
Describe preventive and control measures	Study the preventive and control measures including the indications for prophylaxis Study epidemiological factors related with Leishmaniasis	Study the preventive and control measures including indication for prophylaxis	Study the preventive and control measures	Study the preventive and control measures
Identify epidemiological factors related with Leishmaniasis	Study epidemiological factors related with Leishmaniasis	Study epidemiological factors related with Leishmaniasis	Study epidemiological factors related with Leishmaniasis	Study epidemiological factors Related with Leishmaniasis

Table 2 Attitude – Objectives and Activities by category of Students

Learning Objective	Activities			
	H.O	P.H.N.	EHT	MLT
Help believe that Leishmaniasis is preventable	Encourage preventive measure of Leishmaniasis Use different health education methods such as health talks , demonstration (campaign), mass media , community mobilizations Income specially mothers	Encourage preventive measure Use different health education methods such as health talks , demonstration(campaign.) mass medical community mobilization	Encourage preventive Measures of Leishmaniasis Use different health education methods such as health talks , Demonstration (campaign) , Media Community Mobilizations	Encourage preventive Measures of Leishmaniasis Use different health education methods Such as health takes demonstration (campaign) Mass media community mobilizations
Help believe that Leishmaniasis is treatable	- Provide information that Leishmaniasis is curable if medication is taken at the right time dose and duration	Provide information that Leishmaniasis is curable if medication is taken at the right time , dose and duration	Provide information that Leishmaniasis is curable if medication is taken at the right time , dose and duration	Provide information that Leishmaniasis is curable If medication is at the right with the dose and duration
Convince treating cases decrease transmission of Leishmaniasis	- encourage people to come early for diagnosis and treatment - In Leishmaniasis area any person with fever should visit the near by health institution	Encourage people to come early for diagnosis and treatment - In a Leishmania area any person with fever should visit the near by health institution facilitate / organize community distribution of Leishmaniasis drugs when over needed.	Help in organizing community distribution of anti-Leishmaniasis drugs whenever there is a need	Help in organizing community distribution of anti – Leishmaniasis drugs whenever there is a need
Believe in mothers and caregivers role in the treatment of Leishmaniasis	- Understand & advice that care givers are as equally important as health professionals in the treatment of Leishmaniasis - Respect care givers & communicate clearly	- Understand advice that care givers are as equally important as health professionals in the treatment of Leishmaniasis - Respect caregivers & communicate clearly - Make care giver understand their role	- Understand and advice that care givers are as equally important as health professionals in the treatment of Leishmaniasis - Respect care givers and communicate clearly	- understand and advice that care givers are as equally important as health professionals in the treatment of Leishmaniasis
Help believe self protective measures reduce the risk Leishmaniasis	Give health education on self protection such as use of sand flie nets , window screens insect repellent , clothing , and prophylaxis	Give health education on self protection such as use of sand flie nets , window screens , insect repellent , and clothing , prophylaxis	Give health education on self protection such as use of sand fly nets , window screens insect repellent clothing and prophylaxis	Give health education on self protection such as use of sand flie nets , window screens insect repellent clothing and prophylaxis

Table 3 Attitude – Practical objectives and Activities by category of Students

Learning Objective	Activities			
	H.O	P.H.N.	EHT	MLT
Detect early and treat Leishmaniasis case	<ul style="list-style-type: none"> - conduct home visit - treat the cause as recommended - Establish and utilize the surveillance system - Predict manage and evaluate an epidemic - Early referral if required provide H.E on the importance of - Early medical seeking and treatment 	<ul style="list-style-type: none"> - Conduct home visit treat the case as recommended - Give treatment as prescribed provide H.E on the importance early medical seeking and treatment - Give supportive care for admitted patients 	<ul style="list-style-type: none"> - Conduct home visit - Establish and utilize the surveillance system - Provide H.E on the importance of early medical seeking and treatment 	<ul style="list-style-type: none"> - Conduct home visit - Process and examine samples
Involve mothers and caregivers (clarinets) in the movement of Leishmaniasis	<ul style="list-style-type: none"> Communicate properly with mothers and caregivers or patients about the importance o of taking medication early as prescribed follow up assess patient respo9nses to medication identify specific caregivers and mothers roles 	<ul style="list-style-type: none"> Communicate properly with the caregivers and mothers or patient about the importance of taking medication early as prescribed Follow up to assist patient response to medication Identity specific mothers and caregivers roles 	<ul style="list-style-type: none"> Communicate properly with the mothers and caregivers or patients on self and environmental protections 	<ul style="list-style-type: none"> Communicate properly with the mothers and caregivers or patients Encourage and advise patients or caregivers to cooperate in giving blood sample
Promote practice of self protection	<ul style="list-style-type: none"> - Initiate they use of sand fly nets , with do screens , local repellents e.g. plants - Encourage protection of the body with clothes 	<ul style="list-style-type: none"> Initiate the use of sand fly nets , window screens local repellents e.g. Plants Encourage protection of the body with clothes 	<ul style="list-style-type: none"> Initiate the use of sand flie nets , window screens , local repellents e.g., plants smoke encourage protection of the body with clothes 	<ul style="list-style-type: none"> Initiate the use of sand flie nets, widow screen , local repellents e.g. Plants smoke encourage protection the body with cloths
Promote environmental management	<ul style="list-style-type: none"> Encourage & conduct environmental control to prevent the attraction and breeding of sand flies 	<ul style="list-style-type: none"> Encourage & conduct environmental control to prevent the attraction and breeding of sand flies 	<ul style="list-style-type: none"> Encourage & conduct environmental control to prevent the attraction and breeding of sand flies 	<ul style="list-style-type: none"> -

UNIT FIVE

GLOSSARY

Amastigote: oval, nonflagellated morphological form found in some of the hemoflagellate life cycle

Axoneme: - intracellular portion of the flagellum

Blepharoplast: - Basal body structure in hemoflagellates from which the axoneme arises

Definitive host: - host in which the adult and/ or sexual phase of a parasite occurs

Flagella- Tail- like extensions of the cytoplasm which provide a means of motility

Intermediate host: Host in which the larval or sexual phase of a parasite occurs

Promastigotes: long, slender hemoflagellate morphologic form containing a free flagellum

Undulating membrane: - finlike structure that is connected to the outer edge of some flagellates

Erythrocyte sedimentation rate: - The length of fall of erythrocyte when anticoagulated blood is stand erected for 1 hour

Kintoplast: - Structure consisting of a dotlike blepharoplast and a parabasal body

UNIT SIX

ABBREVIATIONS

CL	-cutaneous leishmaniasis
VL	-Visceral Leishmaniasis
MCL	-Mucocutaneous leishmaniasis
PKDL	-Post kala azar dermal Leishmaniasis
EDTA	-Ethylene Di- potassium diamine tetra acetic acid
NNN media	- Novy- Nicolle –McNeal
LD Bodies	-Leishman Donovan Bodies
IgG	- immunoglobulin G
IgM	- Immuno globulin M
DAT	- direct agglutination test
HIV	- Human Immuno deficiency virus
MCL	- Mucocutaneous leishmaniasis

UNIT SEVEN

BIBLIOGRAPHY

1. Service M W, Medical Entomology for Students, 2nd edition, Chapman and Hall, New York, Philadelphia, 1996
2. Purdom P.W, Environmental Health, 2nd edition, Bruce Jouanovian Publishers, New York, 1980
3. Brunner and sudrath's text book of medical and Surgical Nursing, 9th edition
4. Pharmacology for Nurses
5. Gordon c. Cook and Alimudin Zumla, Manson's tropical Diseases, 21st edition, WB Saunders, 2003
6. Braunwald, Fauci, Kasper, Harrison's Principles of Internal Medicine, 15th edition, McGraw-Hill medical Publishing division, 2001
7. Lawrence M. Tierney.Jr,Stephen J. Mcphee,Current Medical diagnosis and treatment,42nd edition, Lange medical books/McGraw-Hill,2003

UNIT EIGHT

ANNEXES

8.1 Answer keys

8.1.1 For all categories

1. Protozoa
2. Sandflies
3. Human beings, Hyraxes, Rodents, Sylvatic Mammals
4. Visceral, Cutaneous, Mucocutaneous, Post Kalazar dermal Leishmaniasis
5. L.majar, L.tropica, L.infantum, L.aethiopica, L.donovani
6. C
7. E
8. A
9. Western borders, Central and Eastern borders of the country
10. Case detection and treatment, Sandfly control, Reservoir control

8.1.2 For health officer and Public Health Nurses

1. A
2. E
3. B
4. For reproduction
5. Amastigotes and promastigotes
6. Localized and Generalized Cutaneous Leishmaniasis
7. Grey discoloration it imparts on patients
8. A
9. Leishman Donovan (LD) bodies
10. B
11. Espundia
12. E

8.1.3 for Medical Laboratory

1. B
2. B
3. C
4. A
5. B
6. A
7. D
8. B
9. D
10. D
11. C

8.1.4 For Environmental Health Science

- | | |
|------|-------|
| 1. D | 7. B |
| 2. A | 8. C |
| 3. B | 9. C |
| 4. C | 10. D |
| 5. A | 11. B |
| 6. C | 12. A |