SOIL-TRANSMITTED HELMINTHIASIS

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INTRODUCTION

- Caused by intestinal:
  - Roundworms (Ascariasis),
  - Hookworms (Necator americanus and Ancylostoma duodenale) and
  - Whipworm (Trichuris trichiura)

- About 24% of world's population or 1.5 billion people are infected.

- Over 270 million pre school children and over 600 million school age children
  - live in areas where these parasites are intensively transmitted and
  - in need of treatment and preventive interventions.

MODE OF TRANSMISSION

- It is transmitted by eggs
  - Adult worms live in intestine where they produce thousands of eggs each day.

- Several ways :

a) eggs that are attached to vegetables and salads not carefully cooked, washed or peeled.
b) eggs are ingested from contaminated water sources
c) eggs are ingested by children who play in soil and then put their hands in their mouth without washing them.

- People become infected with hookworm primarily by **walking barefoot** on contaminated soil.
- No direct person-to-person transmission, or infection from fresh faeces.
- Need about three weeks to mature in the soil.
- Re-infection occurs only as a result of contact with infective stages in the environment.

ASCARIASIS

- *Ascaris lumbricoides*
- Clinically manifested by vague symptoms of nausea, abdominal pain and cough.
- Occasionally, may produce intestinal obstruction or may migrate into the peritoneal cavity.

Prevalence

- Cosmopolitan in distribution.
- Common helminthic infestation.
- One billion (807-1121 million) infected
- 12 million acute cases
- 20,000 or more deaths.
- Heavy infection is common in children aged 3-8 years.

EPIDEMIOLOGICAL FEATURES

a) AGENT : ***Ascaris lumbricoides***

- Lives in lumen of small intestine.
- Female measures 20-35 cm in length and the male is 12-30 cm.
- Egg production is very heavy
  - an estimated 2,40,000 eggs per day by each female excreted in the faeces.
- Infective in 2-3 weeks

- Larvae
  - penetrate the gut wall
  - carried to the liver and then to the lungs via blood stream
  - moult twice alveolar walls and migrate into the bronchioles coughed up through the trachea and then swallowed by the human host.

- Mature into adults in 60-80 days.

- Life span : 6-12 months.

b) **RESERVOIR OF INFECTION :**

- Man is the only reservoir

c) **INFECTIVE MATERIAL :**

- Faeces containing the fertilized eggs.

d) **HOST :**

- Important disseminators of infection
- *High degree of host-parasite tolerance*
- Contribute to malnutrition.

(e) ENVIRONMENT :

- Ascaris is a “soil-transmitted” helminth.
- Temperature, moisture, oxygen pressure and ultra-violet radiation from the sunlight.

(f) HUMAN HABITS :

- Indiscriminate open air defecation.
- No regular habits by children pollute the house and surrounding areas.

- **PERIOD OF COMMUNICABILITY**
  - until all fertile females are destroyed and stools are negative.

- **INCUBATION PERIOD**
  - 18 days to several weeks.

SYMPTOMS

- Light infection usually have no symptoms.
- A range of symptoms including intestinal manifestations like diarrhoea, abdominal pain, general malaise, weakness, impaired cognitive and physical development
- **Heavy infection**: more than 50000 eggs per gram of faeces.

- Larvae migration cause fever, cough, sputum formation, asthma, skin rash, oesinophilia.

- Roundworm aggregate masses can cause volvulus, intestinal obstruction or intessusception.

- Bowel perforation in the ***ileococcal region***, blocking common bile duct or may come out with vomit.

HOOKWORM INFECTION

- Any infection caused by:
  - *Ancylostoma duodenale*
  - *Necator americanus*

PROBLEM STATEMENT

- Main nematodes causing hookworm infection in man.
- Europe and South- western Asia, and
- Tropical Africa and in the Americas.
- About **576-740 million** cases, of these about 80 million were severely affected.

- *A. duodenale* in North India and *N. americanus* in South India.
- More than ***200 million people*** in India are

EPIDEMIOLOGICAL DETERMINANTS

Agent factors :

(a) Agent :

- Small intestine, ***mainly jejunum***
- Males measure 8 to 11 mm and females 10 to 13 mm.
- *A. duodenale* : 10,000–30,000 eggs and
- *N. americanus* : 5000–10000 eggs
- Egg hatches after 1–2 days.

- Rhabditiform larva moults twice in the soil
- Skin penetrating third stage infective larva within 5-10 days.
- Move very little horizontally, migrate ***upwards on blades of grass***.
- Enters the body through skin
- *A. duodenale* are also infective by mouth.

- Once inside the body, they migrate *via* lymphatics and blood stream to the lungs.
- Sexually mature.
- Adult *A. duodenale* and *N. americanus* are survive for 1-4 years.

(b) RESERVOIR :

- Man

(c) INFECTIVE MATERIAL :

- Faeces containing the ova of hookworms.

(d) PERIOD OF INFECTIVITY :

- As long as person harbours the parasite.

HOST FACTORS

(a) AGE AND SEX :

- All ages and both sexes

(b) NUTRITION :

- malnutrition is a predisposing factor

(c) HOST-PARASITE BALANCE :

- In endemic areas, a host-parasite balance: worm load is limited

(d) OCCUPATION :

- a higher prevalence in agricultural than in town works
- an occupational disease of the farming community.

ENVIRONMENTAL FACTORS

- Lives in upper half-inch (1.2cm) of the soil.

(a) **SOIL :**

- damp, sandy or friable soil decaying vegetation favourable.

(b) TEMPERATURE :

- 24 to 32 deg. C favourable.

(c) MOISTURE :

- dryness is rapidly fatal.

(d) RAINFALL :

- 40 inches (100cm) favourable environmental

  Number of rainy days spread out evenly through out the year.
- Flooding is an unfavourable.

(e) SHADE :

- Direct sunlight kills the larvae

(f) HUMAN HABITS:

- Indiscriminate defecation,
- Using the same places for defecation,
- Going barefoot,
- Farming practices using untreated sewage,
- Children wading in the infected mud bare-feet and hands
- *Compounded by social factors such as illiteracy, ignorance and low standard of living.*

INCUBATION PERIOD
(Prepatent period)

- *N. americanus* is 7 weeks
- *A. duodenale* is 5 weeks to 9 months.

EFFECTS OF THE DISEASE

(a) INDIVIUAL :

- Chronic blood loss and depletion of body's iron stores : iron-deficiency anaemia.
- Health of mothers in terms of increase morbidity, low birth weight babies, abortion, stillbirths and impaired lactation;
- Health of adults incapacity for sustained hard work
- a loss of blood plasma into the small intestine leading to *hypoalbuminaemia.*

(b) COMMUNITY :

- significant and harmful effect on various aspects of economy and quality of life of a community.

WHIPWORM

- Third most common soil-transmitted.

Prevention & Control of Soil Transmitted Helminths

Primary prevention:

- Most effective in interrupting transmission
- Sanitary disposal of human excreta
- Provision of safe drinking water
- Food hygiene habits
- Health education
  - Use of sanitary latrines, personal hygiene, wearing protective footwear

Secondary prevention:

- Albendazole: 400mg stat
- Mebendazole: 100mg BD for 3 days
- Levamisole: 2.5mg/kg stat
- Pyrantel: 10mg/kg stat.

- Iron Folic acid for treatment of anemia.

कृमि से मुक्ति, बच्चों को शक्ति

कृमि संक्रमण से मुक्ति पाऐं!

क्या आप जानते हैं कि कृमि संक्रमण से :

1. शरीर और दिमाग का सम्पूर्ण विकास नहीं होता है
2. कुपोषण और खून की कमी होती है, जिसके कारण हमेशा थकावट रहती है

डीवर्मिंग की दवाई लेने से इसका इलाज आसान है

10 और 13 फरवरी 2015

यह दवाई सभी सरकारी विध्यालयों में निःशुल्क दी जायेगी।
यह दवाई बच्चों को दिलाऐं, कृमि के हानिकारक प्रभावों से मुक्ति पाएं।

किसी भी गंभीर स्थिति में अपने नजदीकि स्वास्थ्य केन्द्र में सम्पर्क करें

NATIONAL HEALTH MISSION

Evidence Action

Deworm the World Initiative

NATIONAL DEWORMING DAY

10 February 2016

Deworming tablet will be given on **10 February 2016** across all Schools and Anganwadi centres free of cost. Ensure that all children are dewormed.

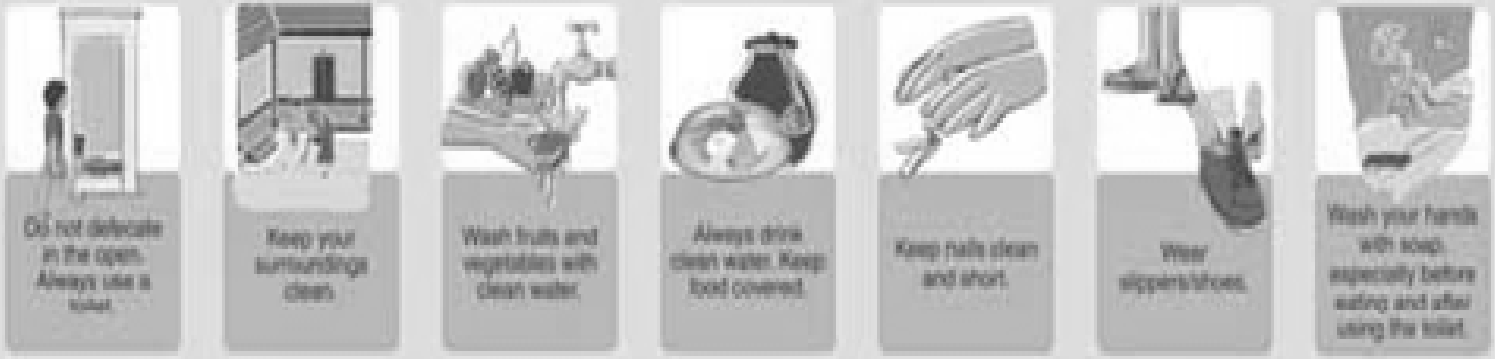
Children who are not be dewormed on National Deworming Day due to absenteeism or sickness must be given the tablet on **15 February 2016.**

27 Crore children will benefit

Did you know worms can make your child:

• Anaemic • Undernourished • Weak • Too sick and tired to concentrate or even attend School

WAYS TO PREVENT WORM INFESTATION



Worm-Free Children, Healthy Children

AMOEBIASIS

- Protozoan parasite *Entamoeba histolytica*
- Common infection of the human gastro-intestinal tract.
- 10% of infected individuals are symptomatic.
- A potentially lethal disease
- Substantial morbidity and mortality

- Subdivided into:
- **Intestinal amoebiasis**:
  - Intestinal infection will develop invasive amoebiasis
  - Mild abdominal discomfort and diarrhoea to acute fulminating dysentery.

- **Extraintestinal amoebiasis**:
  - involvement of liver (abscess), lungs, brain, spleen, skin, etc.

PROBLEM STATEMENT

WORLD :

- A worldwide distribution.
- Major health problem in the whole of China, South East and West Asia and Latin America, especially Mexico.
- 500 million people carry E. histolytica in their intestinal tract
- One-tenth of infected people suffer from invasive amoebiasis.
- Probable that invasive amoebiasis, accounted for about 100,000 deaths in the world.

- Prevalence rates vary from as low as 2% to 60%
- High prevalence, amoebiasis occurs in endemic forms as a result of high levels of transmission and constant reinfection
- Epidemic water-borne infections can occur if there is heavy contamination of drinking water supply.

INDIA :

- Amoebiasis affects about 15% of the Indian population
- Reported throughout India
- Prevalence rate is 15% ranging from 3.6 to 47.4% in different areas.
  - Variations in clinical diagnostic criteria
  - Technical difficulties in establishing a correct diagnosis and lack of sampling criteria.

EPIDEMIOLOGICAL DETERMINANTS

(a) AGENT :

- Potentially pathogenic strains of *E. histolytica*.
- E. histolytica can be differentiated into at least 17 zymodemes
  - population of organisms differing from similar population in the electrophoretic mobilities of one or more enzymes
  - Pathogenic strains are all from particular zymodemes
  - Quite distinct zymodemes
  - The iso-enzyme determine why a particular zymodeme is able to invade.
  - Identified 7 potentially pathogenic and 11 non-pathogenic zymodemes.

- Invasive strains give rise to faecal cysts and the organisms breed true.

- E-histolytica exists in two forms
  - vegetative (trophozoite) and cystic forms.
- Multiply and encyst.
- Cysts are excreted in stool.
- Ingested cysts release trophozoites
- Invade the bowel and cause ulceration
- Caecum and ascending colon rectum - vein and reach the liver and other organs.

- Short-lived outside the human body
- Not important in the transmission of the disease.

- **Cysts**
  - Infective to man
  - Remain viable and infective for several days in faeces, water, sewage and soil in the presence of moisture and low temperature.
  - Cysts are not affected by chlorine.
  - Readily killed if dried, heated (to about 55 deg C) or frozen.

(b) RESERVOIR OF INFECTION :

- Man is the only reservoir of infection
- Immediate source – faeces containing the cysts.
- Symptom free and are healthy carriers of the parasite.
- 1.5×10^7 cysts daily.
- Carriers engaged in the preparation and handling of food.

(c) PERIOD OF COMMUNICABILITY :

- As long as cysts are excreted – several years
- If cases are unrecognized and untreated.

HOST FACTORS

- Any age
- No sex or racial difference in the occurrence of the disease
- A household infection

ENVIRONMENTAL FACTORS

- More closely related to poor sanitation and socio- economic status than to climate
- Use of nightsoil for agricultural purpose favours the spread of disease
- Marked wet-dry seasons
- Higher during rains, presumably since cysts may survive longer and the potential for transmission is thereby increased
- Epidemic outbreaks-sewage seepage into the water supply

MODE OF TRANSMISSION

(i) Faecal-oral route :

- Readily take place – intake of contaminated water or food.
- Epidemic water-borne infections
- Heavy contamination of drinking water supply
- Vegetables, especially those eaten raw, from fields irrigated with sewage polluted water can readily convey infection
- Viable cysts found on the hands and under finger nails

(ii) Sexual transmission :

- oral-rectal contact is also recognized, especially among male homosexuals.

(iii) Vectors :

- flies, cockroaches and rodents are capable of carrying cysts and contaminating food and drink.

INCUBATION PERIOD

- About 2-4 weeks or longer

PREVENTION AND CONTROL

(1) Primary Prevention :

- Primary prevention centre round preventing contamination of water, food, vegetables and fruits with human faeces

(a) Sanitation :

- Safe disposal of human excreta
- The elementary sanitary practice of washing hands after defecation and before eating

- A crucial factor in the prevention and control of amoebiasis.

- Too many hurdles (both social and economic)
- Cooperation of the local community
- The sanitary systems should be selected and constructed taking into consideration the customs and practices of the population and the available resources.

(b) Water supply:

- Protection of water supplies against faecal contamination
- Amoebic cysts may survive for several days and weeks in water
- Not killed by chlorine in amounts used for water disinfection
- Sand filters are quite effective in removing amoebic cysts.
- Water filtration and boiling are more effective

(c) Food Hygiene:

- Protection of food and drink against faecal contamination
- Uncooked vegetables and fruits can be disinfected with aqueous solution of acetic acid (5-10 %) or full strength vinegar
- Thorough washing with detergents in running water will remove amoebic cysts from fruits and vegetables
- Since food handlers are major transmitters of amoebiasis: Periodically examined, treated and educated in food hygiene practices such as hand-washing

(d) Health Education :

- In the long-term, a great deal can be accomplished through health education of the public.

Secondary Prevention

(a) Early Diagnosis :

- Demonstration of trophozoites in red cells is diagnostic
- Fresh mucus passed per rectum
- Microscopy – absence of pus cells in the stool may be helpful in the differential diagnosis with shigellosis
- Serological tests negative in intestinal amoebiasis
  - If positive- a clue to extraintestinal amoebiasis
- Indirect haemagglutination test (IHA) is regarded as the most sensitive serological test
- Counter immuno-electrophoresis (CIE) and ELISA technique

(b) Treatment :

(i) Symptomatic cases :

- symptomatic cases can be treated effectively with Metronidazole orally and 48 hours may confirm the suspected diagnosis
  - 30 mg/kg of body weight/day into 3 doses for

- Suspected cases of liver abscess should be referred to the nearest hospital

(ii) Asymptomatic infections :

- In an endemic area,
  - the consensus is not to treat
  - Probability of reinfection is very high however, be treated, if the carrier is a food handler
- In non-endemic areas
  - always likely to be treated
  - Oral diodohyroxyquin, 650 mg TDS (adults) or 30-40 mg/kg of body weight/day (children) for 20 days, or
  - Oral diloxanide furoate, 500 mg TDS for 10 days (adults)

- No acceptable chemoprophylaxis for amoebiasis.
- Mass examination and treatment cannot be considered a solution for the control of

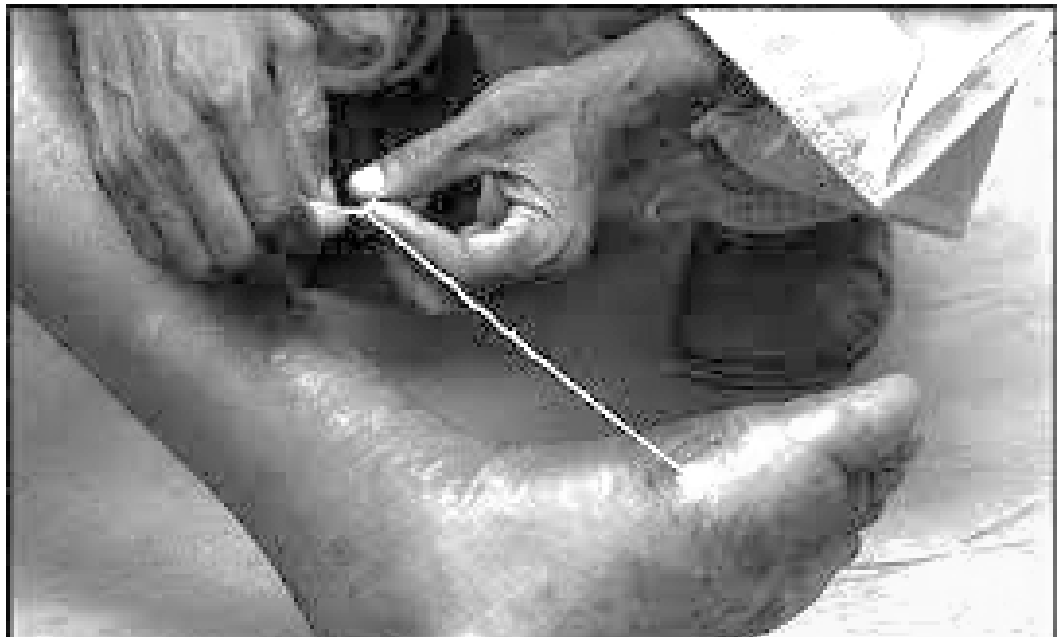
DRACUNCULIASIS

- A crippling parasitic disease on the verge of eradication, with only 22 human cases reported in 2015.
- Of 20 countries that were endemic in the mid-1980s, only 4 countries reported cases in 2015 (Chad (9), Mali (5), South Sudan (5) and Ethiopia (3)

Dracunculiasis

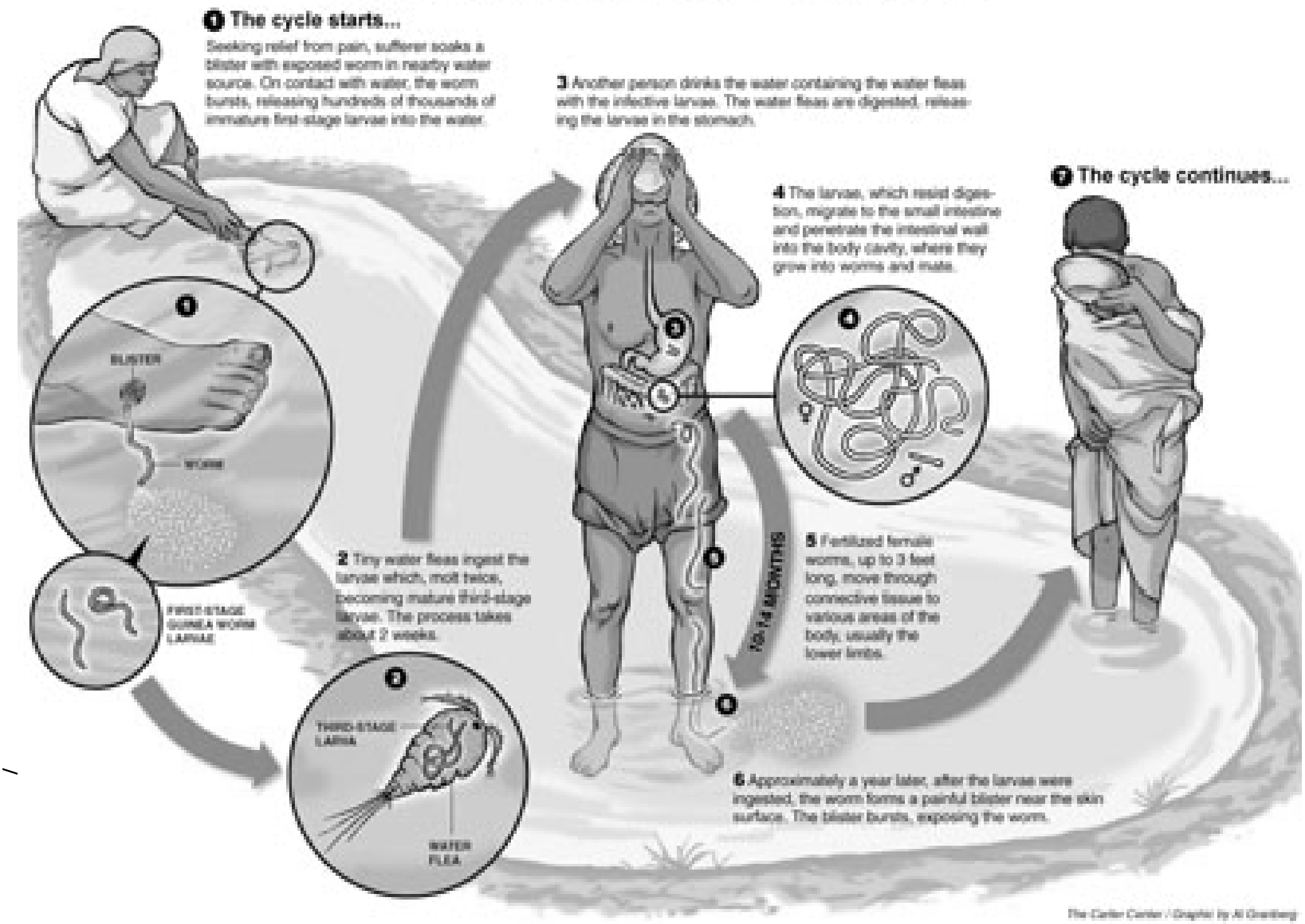
- Commonly known as guinea-worm disease
- A crippling parasitic disease
- Caused by *Dracunculus medinensis* – a long, thread-like worm.
- It is transmitted exclusively when people drink stagnant water contaminated with parasite-infected water fleas.

- Dracunculiasis is rarely fatal, but infected people become non-functional for weeks.
- It affects people in rural, deprived and isolated communities who depend mainly on open surface water sources such as ponds for drinking water.



- The disease is usually transmitted when people who have little or no access to improved drinking water sources
- Swallow stagnant water contaminated with parasite-infected water-fleas (cyclops) that carry infective guinea-worm larvae.
- From the time infection occurs, it takes between 10-14 months for the cycle to complete until a mature worm emerges from the body.

The Life Cycle of Guinea Worm Disease



The Carter Center / Graphic by Al Granberg

Transmission, life-cycle and incubation period

- About a year after infection, a painful blister forms – 90% of the time on the lower leg – and one or more worms emerge accompanied by a burning sensation. To soothe the burning pain, patients often immerse the infected part of the body in water. The worm(s) then releases thousands of larvae (baby worms) into the water. These larvae reach the infective stage after being ingested by tiny crustaceans or copepods, also called water fleas.
- People swallow the infected water fleas when drinking contaminated water. The water fleas are killed in the stomach but the infective larvae are liberated. They then penetrate the wall of the intestine and migrate through the body. The fertilized female worm (which measures from 60–100 cm long) migrates under the skin tissues until it reaches its exit point, usually at the lower limbs, forming a blister or swelling from which it eventually emerges. The worm takes 10–14 months to emerge after infection.

Prevention

- There is no vaccine to prevent, nor is there any medication to treat the disease.
- Prevention strategies include:
- Heightening surveillance to detect every case.
- Treatment, cleaning and bandaging regularly the affected skin-area until the worm is completely expelled from the body.
- Preventing drinking water contamination by advising the patient to avoid wading into water.
- Ensuring wider access to improved drinking-water supplies.
- Filtering water from open water bodies before drinking;
- Implementing vector control by using the larvicide temephos.

Guinea Worm Eradication Programme (GWEP)

- Launched in 1983-84

- The second communicable disease which has been eradicated from the country,
  - by the efforts of NICD and the concerned states.

- Certification of India as a Guinea Worm disease free country by the World Health Organisation in February 2000.

Guinea-worm Eradication in India

- Encouraged with the success of “Small-pox Eradication”, the Ministry of Health & Family Welfare, Government of India launched the National Guinea Worm Eradication Programme (GWEP) in 1983-84 as a centrally sponsored scheme on a 50:50 sharing basis between Centre and States with the objective of eradicating guinea worm disease from the country. The National Institute of Communicable Diseases (NICD), Delhi was designated as the nodal agency for planning, co-ordination, guidance and evaluation of GWEP in the country. The Programme was implemented by the endemic State Health Directorates through the Primary Health Care system. The Ministry of Rural Development, Govt. of India, State Public Health Engineering Departments, and the Rajiv Gandhi National Drinking Water Mission (Rural Water Supply) assisted the Programme in provision and maintenance of safe drinking water supplies and conversion of unsafe drinking water sources, on priority, in the guinea worm affected areas.

Strategy under GWEP

- Guinea worm case detection and continuous surveillance through three active case search operations and regular monthly reporting
- GW case management
- Vector control by the application of Temephos (50% EC) in unsafe water sources eight times a year and use of fine nylon mesh/double layered cloth strainers by the community to filter cyclops in all the affected villages
- Provision and maintenance of safe drinking water supply on priority in GW endemic villages
- Trained manpower development
- Intensive health education

Treatment Plan A, B & C for Diarrohea (IMNCI)

- MANAGEMENT OF DIARROHEA:
- Assess the state of dehydration
- Choose the treatment plan A, B or C

PLAN A (diarrhoea, no dehydration)

1. Give extra fluid:
   - Breastfeed frequently
   - Give ORS and cooled boiled water Plus food-based fluid (not exclusively breastfed)
2. Continue Feeding:
   - Feed as usual on demand
   - Avoid food high in simple sugar as osmotic load may worsen the diarrhea
3. When to Return (to clinic/hospital):
   - Not able to drink, Becomes sicker, Develops fever, Has blood in stool

PLAN B
(diarrhoea, some dehydration)

- Give recommended amount of ORS 4-hourly
- Approximate amount of ORSs required (ml):
  weight (in kg) x 75

- After 4 hours:
  - Reassess the child
  - Select appropriate treatment
  - Begin feeding the child
  - Explain the 3 rules of PLAN A

PLAN C
(diarrhoea, severe dehydration)

- Start IV fluid immediately.
- Give 100ml/kg Ringers Lactate/ Normal Saline:

Age	First give 30 ml/kg	Then give 70ml/kg
Under 1 year	1 hour	5 hours
1 year and above	½ hour	2 ½ hours

- Reassess the child every 1-2 hour during rehydration
- Give ORS as soon as the child can drink.
- Classify the degree of dehydration