Lymphatic Filariasis in Children

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INTRODUCTION

Lymphatic filariasis (LF) is a common vector-borne parasitic disease of the socially and economically challenged population in the tropical countries. Estimated to infect globally over 120 million people, LF is a major public health problem in India accounting for 40% of the world disease burden. This disease is now targeted for elimination globally by the year 2020. Towards this the Global Programme for the Elimination of LF (GPELF) is launched by WHO in the year 2000 with the cooperation of the endemic countries. LF is targeted for elimination in India by the year 2015.

Lymphatic filariasis is a baffling disease in several respects. The initial stages of this infection are not associated with any outward disease. There is a long interval between acquiring the infection and development of clinical disease. Recent studies have shown that in the later stages of this disease when they present with clinical manifestations, there is no evidence of active parasitic infection in many persons. In chronic lymphoedema night blood examination to detect microfilaria (mf), ICT card test for filarial antigenaemia and ultrasonography for locating the adult worms are usually negative. This makes the treatment of LF rather difficult.

There is plenty of evidence now, which suggests that LF infection is acquired first in childhood in several instances, even though the clinical manifestations start appearing much later, mostly in adult life. Abnormalities of the lymph vessels like lymphangiectasia and renal involvement have been demonstrated in early stages of the infection even in children, when they have only mf in their blood without any overt clinical disease. It appears that once established, this early lymph vessel dilation tends to be irreversible even with treatment, causing progression of the disease and ultimately ending up with elephantiasis in a proportion of those infected. The progression of the disease mostly results from repeated attacks of acute adenolymphangitis (ADL) precipitated by secondary bacterial infections gaining entry in the affected limbs through skin lesions caused by injuries, fungal infections etc. that act as ‘entry lesions’ for these bacteria.

LF IN CHILDREN - OVERLOOKED IN THE PAST

LF was always thought to be a disease of the adults. The swollen limbs, hydrocele,
lymphoedema of the scrotum and chyluria are seen mostly in adults. Acute attacks of ADL involving the affected limbs are also more common in the adult population, because these episodes are usually associated with later stages of lymphoedema.

There are several reasons why the incidence of LF in the childhood did not attract much attention in the past. In the natural history of this disease, the early stage of infection characterized by asymptomatic microfilaraemia is remarkably silent and lasts for varying periods. Progression of the disease is amazingly slow in most. The routine stained, thick blood smear examination at night to detect microfilaria is not sensitive enough to detect all infected children. This is especially so when the density of mf is low in children and the infection is in an early stage where the adult worms have not started producing mf. Many epidemiological studies in the past did not include children less than 5 years. Due to these facts, in the past many early LF infections in children were missed.

**EVIDENCE FOR CHILDHOOD INFECTION**

Findings from many recent studies including results of newer tests to detect filarial antigenaemia, specific antibody tests, ultrasound examination and lymphoscintigraphy in children indicate the importance of LF as a childhood infection. Clustering of children with mf has been described in families, which is attributed to exposure to infection within the household more than prenatal sensitisation or genetic factors. At our LF research centre in T.D. Medical College Hospital, Alappuzha, we had observed that among the asymptomatic, microfilaria positive adults aged ≥ 18 yrs, screened during 12 years, about 30% were aged ≤ 20 years. Many children included in our earlier studies were found to have mf on night blood examination. In a study on prevention of ADL attacks in patients with lymphoedema, 32% of the subjects recalled during their interview that the first manifestation of their disease was noted before they were 15 years of age.

**Clinical manifestations:** Lymphoedema of the limbs has been reported among children, especially in those <10 years in endemic areas for LF. Hydrocoele in boys of pubertal age and ADL attacks are seen in children with lymphoedema. Lymph node enlargement is a well-known clinical presentation of LF in childhood. Tropical pulmonary eosinophilia is also described in children.

**Microfilaraemia:** Many studies on mf prevalence in endemic areas have shown a constant relationship between microfilaraemia in children and adults. The childhood mf prevalence rates were shown to be ~30% of adult prevalence for <10 year olds and ~ 69% for 10-19 years olds. Children born of mothers with mf had higher risk of developing microfilaraemia when compared to those of uninfected mothers.

**Filarial antigenaemia:** ICT card test using daytime blood is now available to detect the circulating filarial antigen indicating presence of live adult worms in bancroftian filariasis. Presence of
filarial antigenaemia, which is more sensitive than detecting mf, has been shown among 6% of the two-year old children in endemic areas and the prevalence increased to 30% in four-year olds. 

**Ultrasonography:** Like in adult males, ultrasound examination of scrotal lymphatics in microfilaraemic boys aged 14-16 years had revealed the presence of adult filarial worms, indicated by the 'Filaria Dance Sign' (FDS) along with diffuse dilatation of the lymphatic vessels in *W. bancrofti* infection. The FDS was also seen in girls in their crural lymphatics and axillary lymph node.

**Histopathology:** Biopsy and histopathological studies of lymph nodes in children have occasionally shown adult filarial worms.

**SOCIAL AND PSYCHOLOGICAL ASPECTS OF LF IN CHILDREN**

Clinical manifestations of LF pose several problems in childhood and adolescence. The social stigma and psychological problems are shown to interfere with their education and self-confidence. These include feeling of shame, embarrassment and ridicule especially due to hydrocele. The chronic disease might even interfere with the quality of life of these children as they grow up.

**SALIENT FINDINGS FROM AN ONGOING STUDY ON LF IN CHILDREN CAUSED BY B. MALAYI**

Presently there is a study on LF in 3-15 year-old children being carried out at the Filaria Research Centre at the T.D. Medical College Hospital, Alleppey, Kerala situated in an area endemic for *B. malayi* infection. This study is supported by UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR). Some important interim findings from this study are mentioned below.

**Microfilaraemia:** Among nearly 8000 children screened for LF infection there were 32 children with microfilaraemia ranging from 4-1812 mf/ml on filtration of blood at night. There were 29 children who either gave a history of past microfilaraemia, previous episode of swelling of leg and acute attack or presented with lymphoedema of leg.

**IgG4 antibody test:** Test for filaria specific IgG4 antibody using 'Brugia rapid' dip-stick test was carried out in all the children screened initially in collaboration (Dept. of Microbiology and Parasitology, School of Medical Sciences, Universiti Sains Malaysia). This is a recombinant antigen-based immunochromatographic test that has been developed to detect IgG4 antibody in *B. malayi* infection. This test has shown 97% sensitivity and 99% specificity. Out of 7500 blood spots tested 857 children tested positive for IgG4 antibody.

**Lymphoscintigraphy:** Lymphoscintigraphy using Tc99 labeled Sulphur colloid was done in 100 children who were either mf positive (32), had previous LF infection or disease (29) or were IgG4 positive (39). Dilation of lymph vessels of varying severity in the lower and/or upper limbs was present in most children in all the above three groups.
Ultrasonography: Filaria dance sign (FDS) indicating the presence of live adult worms was seen in 13 children. Six of them were microfilaraemic, six were positive for IgG4 only and the last one had previous history of LF infection. FDS was seen in the axilla in seven and in the thigh in six children. It may be noted that there is no genital involvement in B. malayi infection and so unlike in bancroftian filariasis FDS was not detected in the scrotal region in the boys.

**TREATMENT**

**Antifilarial agents:** Diethylcarbamazine (DEC), ivermectin and albendazole are the anti parasitic drugs presently used for the treatment of LF infection.

**Diethylcarbamazine:** This is the drug of choice in both W. bancrofti and B. malayi infections. DEC remarkably lowers the blood microfilaria levels even after single annual doses of 6 mg/kg and this effect is sustained even at the end of one year. But DEC kills only ~ 50% of adult worms. Ultrasonographic evaluation had shown that single dose of 6 mg/kg body weight DEC kills the adult worms when they are sensitive to this drug. If they are insensitive, even repeated doses do not have any effect. The effective dose of DEC is thus 6 mg/kg body weight given as a single dose in those with evidence of active filarial infection, which may be repeated once in 6 months or yearly. Recent studies have shown that DEC has no role either in the treatment or prevention of the acute ADL attacks.

**Ivermectin:** This drug, in single annual doses of 200 to 400 µgm/kg, keeps the blood microfilaria counts at very low levels even at the end of one year. Ivermectin, though useful as a microfilaricidal agent has no proved action against the adult parasite and so is not indicated in the treatment of LF disease.

**Albendazole:** This well-known antihelminthic drug was shown to destroy the adult filarial worms when given in doses of 400 mg twice daily for two weeks. Albendazole has no direct action on the microfilaria and does not immediately lower the mf counts. But when given in annual single dose of 400 mg in combination with DEC or ivermectin, there is sustained lowering of blood microfilaria levels. In children, apart from the effects on intestinal helminths and the consequent anaemia, other perceived benefits are gain in height and weight and improved performance at school.

**Treatment and prevention of acute ADL attacks:** Children and young adults suffering from lymphoedema are also prone to acute attacks of ADL. Bed rest and symptomatic treatment with simple drugs like paracetamol are enough in mild cases. Any local precipitating factor like injury and bacterial or fungal infection should be treated with local antibiotic or antifungal ointments. Moderate or severe attacks of ADL should be treated with oral or parenteral administration of antibiotics depending on the general condition of the patient.

Many recent studies have shown that with proper 'local care' of the affected
limb these ADL attacks can be prevented. This 'foot-care' programme involves washing of the affected area, especially the webs of the toes with soap and water twice a day or at least once before going to bed and wiping dry with a clean cloth. Clipping the nails at intervals and keeping them clean; preventing or promptly treating any local injuries or bacterial and fungal infections using appropriate local applications and regular use of comfortable foot wear are important.

CONCLUSION
It is now recognized that lymphatic filariasis infection is first acquired mostly during childhood. It is also known that the early pathology of this disease demonstrated even in children, namely the dilatation of lymph vessels, tends to be permanent even with treatment. This lymphangiectasia and stasis favour secondary bacterial infection precipitating ADL attacks and cause progression of lymphoedema. National programme for the elimination of LF has now been launched in India, which also targets children ≥2 years. Towards disability alleviation in children, measures like regular foot-care instituted from early age would be useful in prevention of acute attacks and probably in arresting the development of future lymphoedema. Innovative approaches such as introduction of this foot-care programme in the school curriculum in endemic areas would be a progressive step in this direction.

REFERENCES


