

**Presidential Address 2001****The persistent challenge of tropical disease****Anula Wijesundere\****Journal of the Ceylon College of Physicians, 2002, 35, 18-23*

Disease is as old as mankind. The fight to understand and combat disease has produced some of the greatest achievements in the history of man. The study of medicine has attracted the ablest of minds from Charaka and Susruta, (1500 B.C.), through the eras of Chinese and Egyptian medicine to Hippocrates, the father of modern medicine in the 5th century B.C.

We now live in an era of tremendous technological advancement. The breathtaking advances in the basic sciences have left many clinicians bewildered. Advances in bio-technology have resulted in the determination of the genetic code, DNA cloning techniques, monoclonal antibody techniques, polymerase chain reaction and gene therapy.

Technological advances have resulted in computerized tomography, magnetic resonance imaging and laser therapy. All these technological advances have added completely new dimensions to medical diagnosis and therapeutics.

The twentieth century has therefore seen a global transformation in human health, unmatched in history. In the developed world, the decline in mortality has been dramatic. This has arisen from income growth, improvement of socio-economic standards, improvement of nutrition, sanitation, water supply and better housing. More importantly, the decline in mortality has resulted from access to new knowledge, drugs and vaccines.

Despite the tremendous explosion in medical technology, more than 50% of the world's population live in the tropical region where tropical diseases continue to plague the inhabitants of this region causing countless deaths and incalculable misery.

The origin of tropical medicine as a distinct branch of medicine dates back of 1898 with the publication of

"Tropical Disease" by Sir Patrick Manson, universally regarded as the "Father of tropical medicine".

When the epidemiological transition of disease patterns in the developing world is considered, the early part of the 20th century had the old set of morbidity comprising of communicable diseases, nutritional deficiency, poor sanitation and poverty with high child mortality.

The middle of 20th century saw rapid change with recession of the epidemics. However from 1970-2000 the developing tropical world has had the triple health burden to cope with.

This comprises of:-

1. Unfinished old set of communicable diseases.
2. Rising new set of diseases comprising of cardiovascular disease, malignancy, diabetes, strokes and diseases of ageing
3. Lagging health care systems.

In my Presidential address I will concentrate on tropical diseases of importance to Sri Lanka. Namely malaria, tuberculosis, rabies, Japanese encephalitis, gastroenteritis, snake bite and dengue fever.

**Malaria**

In 1897, in Hyderabad, India when Sir Roland Ross discovered that the Anophiline mosquito transmitted malaria, he thought that malaria would soon be eradicated from the earth. However, today malaria is the most widespread parasitic disease in the world and a major public health problem affecting more than 40% of the world's population. About five hundred million cases of malaria occur globally each year. Mortality from Malaria is around 2.5 million deaths each year. The majority of deaths in malaria occur as a consequence of cerebral malaria. Cerebral malaria particularly occurs as a complication among pre-school children in Central and Western Africa and carries a mortality rate 15%-30%.

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\* *Consultant Physician, Sri Jayawardenepura General Hospital, Sri Lanka.*

*President CCP yr 2001.*

**Major epidemics of malaria in the 20th Century**

<i>Region</i>	<i>Year of epidemic</i>	<i>No. of cases</i>	<i>No. of deaths</i>
Soviet Union	1923-1926	10,000,000	60,000
Ceylon	1934-1935	3,000,000	82,000
Egypt	1942	160,000	12,000
Ethiopia	1958	3,000,000	150,000
Sri Lanka	1967	60,000	
India	1976	7,000,000	
Sri Lanka	1986-1987	6,875,000	
India	1998	2,850,000	

The above statistics confirm that a major epidemic of malaria occurred in each decade in some part of the tropical world. In 1935, a severe epidemic of malaria devastated Ceylon, causing 80,000 deaths. Malaria affected 3 million out of the entire population of 5 million at that time. The infant mortality rate during that year was 500 per 1,000 live births; which meant that one out of every 2 babies born during that year, died of malaria.

**Cerebral malaria**

This is the most devastating complication of *Plasmodium falciparum* infection, carrying a mortality of 15-30%. Cerebral malaria is characterized by the occurrence of convulsions and coma in a patient with *Plasmodium falciparum* malaria where the diagnosis and treatment are delayed. Intravenous Quinine is the gold standard in the treatment of cerebral malaria. Recent studies in Thailand, Myanmar, China indicate that Artemesinin derived from a Chinese herb can reduce mortality in malaria by 50%. However, there is no consensus at present about the best dose, frequency of administration and mode of administration of Artemesinin.

The serious and life threatening complication of malaria are – cerebral malaria, acute pulmonary oedema, peripheral circulatory failure, intravascular haemolysis with haemoglobinuria, acute liver failure, hypoglycaemia and hyperparasitaemia. These complications are seen particularly in the preschool children and pregnant women living in endemic areas. They also occur in non immune colonists and travelers who arrive from non malarial areas to areas of high malarial transmission.

The causes of the global malarial scourge are numerous. Foremost among these are environmental factors such as global warming which enhance the

growth of both the parasite and the vector. Secondly, migration of settlers from non malaria high lands to low lands with high malarial transmission is also of importance. The introduction of small irrigation systems and building new towns within these regions; further consolidate malaria. Emergence of resistance to the range of anti malarial chemotherapy is also a major factor contributing to the global scourge. Today, it is accepted that large scale annihilation of the vector is no longer possible. Focus is therefore now on development of a vaccine for malaria and the use of insecticide impregnated bed nets.

**Insecticide impregnated bed nets**

Use of above bed nets has reduced mortality of malaria by 15-30% in Central Africa. The insecticide used is Pyrethroide, a chemical that is safe even in close contact. Mosquitoes are attracted by the Carbon Dioxide of the exhaled air and are killed or repelled on contact with the insecticide. These insecticide impregnated bed nets have been introduced in the Monaragala and Ampara Districts of Sri Lanka.

**Development of a malarial vaccine**

The first report of an efficacious vaccine was by Manual Pararayo in 1992. He introduced spf 66 malarial vaccine and claimed that his vaccine reduced the incidence of malaria infection by 30% in Tanzanian children. However work done by the Centre for Disease Control (CDC) in Atlanta using the same vaccine in Thailand and Gambia failed to demonstrate efficacy.

**Challenges in malaria control**

This include development of an effective vaccine, further popularization of insecticide impregnated bed nets and introduction of malaria control as an integral part of the national health policy.

Today, malaria research is grossly hindered by lamentable lack of funds. The World Health Organization has allocated only an appalling 80 million American Dollars towards malaria research while research for Alzheimer's disease and AIDS research which receives 300 million and 900 million American dollars respectively. Yet, malaria kills more each year than does AIDS, hepatitis, land mines and scores of other diseases.

### Tuberculosis

The Tuberculosis bacillus was discovered by Robert Koch in 1882. John Bunyan the English poet referred to TB as "The captain of all these men of death". However, effective chemotherapy against TB was introduced in the early 1950s.

Since then, in the industrial world, there has been progressive decline in the incidence of TB. In the developing world however, the incidence of TB remained static or declined slowly. This was the global pattern of TB up to 1985.

### Tuberculosis – the pandemic

From 1985 onwards, the global incidence of tuberculosis rose dramatically. Today, TB is the leading cause of death due to infectious agents. One third of the worlds' population of 2000 million persons have been infected by the TB bacillus. Eight million new cases of TB are reported annually and 3 million die of TB each year globally. Today, TB is the leading cause of death due to infectious diseases. However, treatment of TB is one of the most cost effective among all interventions for life threatening conditions.

The tuberculosis pandemic has arisen due to a number of causes. Amongst them are increased poverty and over population in inner cities, failure to maintain necessary public health infrastructure and migration from countries with high TB prevalence to the West. The impact of HIV on the global rise of TB and the development of multiple drug resistant strains of mycobacteria are also of importance.

Today, tuberculosis the only disease that the WHO has declared as global emergency and introduced the DOTS regime for the control of TB, The DOTS regime means – Directly Observed Treatment Strategy. This has been introduced as an available, effective and affordable mode of therapy.

The DOTS five point policy package envisages –

1. Governments' commitment to the national TB control program.
2. Case finding by sputum smear examination of TB suspected cases in general health surveys.

3. Standard short course chemotherapy for all smear positive cases.
4. Regular uninterrupted supply of all essential drugs.
5. Standardized recording and reporting system.

The future of the tuberculosis pandemic lies on the balance between implementation of effective control measures on one hand and factors promoting the epidemic on the other hand. The factors which promote the epidemic include HIV, wars, natural disasters, demographic changes and the development of resistance to anti TB chemotherapy.

Research efforts are crucial to facilitate the widespread implementation of the recommended TB control strategy and to discover new and better drugs for therapy and new and better vaccines for prevention and control.

Despite the global importance of tuberculosis, the control of this disease is poorly funded at 40 million American dollars annually. Therefore, it is up to concerned governments to provide adequate funds for implementation of control program and invest in research.

### Rabies

Rabies is unique among communicable diseases due to the extreme variability of its incubation period, bizzare nature of clinical manifestations and certainty of fatal outcome. Rabies is caused by infection with rabies virus, an RNA virus of the Rhabdoviridae family, transmitted via the bite of a rabid dog.

The global incidence of rabies is not known. In 1992 the WHO reported 2000 deaths from rabies. However, the actual estimated deaths from rabies in 1992 was over 50,000.

### Rabies in Sri Lanka

Year	No. of cases	Death rate/100,000 population
1973	377	-
1992	287	1.5
1998	196	10

Transmission of rabies in Sri Lanka. - dogs 97%, cats 2%, others 1% (mongoose, jackal, monkeys)

Source – *Epidemiology Bulletin*  
Ministry of Health Jan-Mar 2000

The prodromal features of rabies are non specific and variable and comprise of fever, headache, vomiting,

sorethroat, anxiety, depression, irritability and myalgia. An important diagnostic symptom is intense itching, pain and paraesthesia at the site of bite.

Once rabies is established the features of furious rabies are seen when the rabies virus enters the central nervous system. The clinical features are hydrophobia (fear of water), acrophobia, (fear of air) convulsions, salivation, spasticity, meningism and abnormal breathing which is violent and jerky.

The clinical features of paralytic rabies are seen when the rabies virus has entered the peripheral nervous system. These features are numbness, paraesthesia, fasciculation, flaccid weakness and ascending paralysis.

Management of patients with proven exposure to rabies –

1. Immediate and thorough washing of all wounds with soap and water or iodine solution.
2. Administration of tetanus toxoid
3. Passive immunization with human or equine antirabies serum to each and every site of bite as early as possible.
4. Active immunization with tissue culture vaccine by the intradermal route.

Early treatment is absolutely vital for once the rabies virus enters the nervous system, rabies is inevitable.

#### **Prevention of rabies**

This requires vaccination of all pet and stray dogs and the elimination of all stray and unvaccinated dogs. This would be difficult to achieve in Sri Lanka, a predominantly Buddhist country. Eliminating garbage would certainly help to reduce the stray dog population.

Today, rabies continues to be a major health problem in Sri Lanka. However, Sri Lanka being an island, the possibility of eliminating this terrible disease exists.

#### **Diarrhoeal diseases**

Diarrhoea is a major cause of morbidity and mortality among children globally. Annually, 750 million children develop diarrhoeal diseases globally. About 5 million deaths occur annually as a consequence of diarrhoea globally, particularly among preschool children. Despite advances in science and technology no pathogens can be isolated in over 40% of cases. Rotavirus is the foremost cause among viral diarrhoea while Shigella is the major bacterial pathogen.

The greatest advance in the clinical management of diarrhoea is the introduction and extensive use of oral rehydration solution. This has resulted in significant lowering of mortality from dehydration and its consequences. Still, annually in the developing world, 12 million children die before their 5th birthday. These deaths among the preschool children occur from diarrhoea, pneumonia, measles, malnutrition and malaria.

#### **Japanese encephalitis (JE)**

This is an acute severe neurological disease with widespread inflammation of the brain. Clinically, it is characterized by the triad of fever, headache and impairment of consciousness. JE is a major health problem in the Asia monsoon region and it is a dreaded disease due to high mortality and grave neurological sequelae.

The JE virus is an RNA virus belonging to the Flaviviridae group. It is transmitted to man via the bite of Culex mosquito species. These mosquito larvae bred in paddy fields and feed preferentially on pigs and cattle. The high incidence of JE in Asia results from an interaction of 3 factors viz – weather pattern, rice cultivation and pig breeding.

There are 3 clearly defined stages in the illness. In the prodromal stage, there is fever, headache, vomiting and malaise.

The second stage which is the acute encephalitic stage is characterized by the occurrence of confusion, coma, convulsions, spasticity and respiratory failure. This stage carries a mortality of 15-30%. The third and final stage is the convalescent stage during which the patient improves slowly, totally or partially from the neurological deficits.

Among children who survive JE, 50% have neurological sequelae. These consist of intellectual impairment, epileptic seizures, psychotic disturbances, residual spasticity and personality changes.

In recent years, there has been a dramatic decline in the incidence of JE after introduction of vaccination against JE in Sri Lanka. This vaccine is now recommended for children living in endemic areas, all travelers to endemic areas, and non immune people of all ages coming to reside in endemic areas: in order to prevent a potentially fatal disease.

#### **Leptospirosis**

This is a common tropical disease endemic in Sri Lanka. The infective agent is a spirochete, *Lepto-*

*spira interrogans*. Rats are the principal reservoir of infection while dogs, pigs, goats and bandicoots too could transmit the disease.

It is referred to as "rat fever" or "mee una" of "vel una" in Sri Lanka.

#### Morbidity and mortality from leptospirosis in Sri Lanka

Year	No. of Cases	No. of Deaths
1988	441	18
1990	352	16
1994	2,737	77
1996	1,906	75
1998	3,400	154

Source – *Epidemiology Bulletin, Ministry of Health Jan-Mar 2000*

*Leptospira* are excreted in rat urine and enter the human host through skin abrasion or intact mucus membrane. The features of the illness are high fever, severe muscle pain and red eyes. The complications are acute kidney, liver and heart failure.

Control of leptospirosis would require eradication of the animal reservoir or prevention of disease among animals by vaccination. People who are highly exposed to leptospire such as lab workers and sewer workers can be given chemoprophylaxis with doxycycline weekly. Prophylactic penicillin is recommended following exposure to water known to be contaminated with leptospire.

#### Snakebite

Sri Lanka has the world's highest death rate from snake bite with 2 deaths per day. There are an estimated 60,000 bites in Sri Lanka with 900 deaths annually. There are 93 species of land, sea and fresh water snakes in Sri Lanka. Fortunately only few are highly venomous. The majority of snakes are harmless. Almost all deaths from snake bite in Sri Lanka are caused by Russel's viper, cobra, Indian or Ceylon krait.

The complications of snake bite include reassurance of the patient, gently washing the bitten area with soap and water, removing all rings and bangles in the bitten area, immobilizing the bitten limb and taking the patient to hospital as soon as possible.

The site of the snake bite should not be incised. No chemical should be applied. The patient should not be given any aspirin, alcohol, king coconut water or nasal instillations.

Prevention of snakebite is of utmost importance as always prevention is better than cure.

While walking in snake infested areas (scrub jungles, foot paths and paddy fields), legs must be protected by wearing ankle length garments and foot wear. A stick must be used when walking in snake infested areas. The floor must be banged with the stick to cause vibration of the ground. The snakes then move away, as they are very sensitive to vibration. A source of light must be used to prevent treading on snakes while walking in the dark. The dwellings must be kept free of rats, frogs and lizards as snakes come in search of them into our households.

Caution must be exercised while lifting logs or exploring the thick undergrowth as snakes may be hidden underneath. Lastly, sleeping in open watch huts and verandahs must be avoided to protect against Kraits which are night biters.

The challenge in snake bite is the need to produce an effective anti venom against Krait bites, Russel's and hump nose viper bites.

#### Dengue fever

Sri Lanka has had a major epidemic of dengue fever affecting most urban areas from September to November 2000. Dengue fever is a major health problem in the tropics and is now endemic in many urban areas in Sri Lanka.

About 20 million cases of dengue occur globally each year. Dengue fever is caused by an RNA virus of the Flaviviridae group. There are 4 sero types DEN1, DEN2, DEN3, DEN4. These serotypes have the potential to cause sequential infection with increased severity.

#### Morbidity and mortality from dengue fever in Sri Lanka

Year	No. of Cases	No. of Deaths
1990	350	4
1994	582	7
1998	1275	8
1999	1668	14
2000	2218	25

(up to end of October 2000)

Source – *the Epidemiology Bulletin – Feb-Oct. 2000*

Clinical features of dengue fever depend on whether it is complicated or not. In uncomplicated dengue fever there is fever, muscle pain, headache, pain behind the eyes and a characteristic red rash. In dengue haemorrhagic fever, the platelet count falls below 100,000/cmm. There is evidence of plasma leakage from increased vascular permeability resulting in fluid accumulation in the thorax and abdominal cavities. In the most serious form of dengue or shock syndrome there is evidence of circulatory collapse along with all the other criteria of the shock syndrome.

The dramatic global emergence of dengue has resulted from a number of factors. These include major global demographic change with uncontrolled urbanization and population growth. The deterioration of public health infrastructure with substandard housing and inadequate waste and water management is also responsible. The non existence of effective mosquito control is the causation of dengue cannot be over-emphasized. Increase of air travel between countries help in the transportation of different species of dengue viruses from one country to another.

Control of dengue would therefore need to reduce the population of the *Aedes* mosquito by eliminating breeding sites of mosquito larvae, proper disposal of garbage and draining water from standing pools. Long term control would require solid waste management policy to reduce, reuse and recycle garbage.

During epidemics the mosquito population can also be controlled by space spraying with Fenitrothion.

The challenge in dengue fever involve most importantly, the development of an effective vaccine. This vaccine developed should produce solid immunity to all 4 serotypes.

The mortality from dengue fever has been successfully reduced from 20%-30% by early recognition and fluid replacement. However, as yet no drugs or vaccine are effective against dengue. The development of a second generation vaccine is now being carried out using a Thai attenuated vaccine. At present, there is no likelihood of an effective vaccine for another 5-10 years. Therefore more epidemics of dengue are likely unless unplanned urbanization, transportation, atmosphere pollution and population explosion is controlled and the mosquito menace effectively overcome.

## **Conclusion**

Today in many parts of the tropics, malaria and other tropical parasitic diseases remain major causes of death, disease and disability. In a variety of ways, they limit the scale and scope of human endeavour often denying the people of the tropics, the full enjoyment of the fruits of their labour and enterprise.

In efforts to control these tropical diseases, the success in some places were as dramatic as failure in others. The overall picture is that of persistence of the challenge with the parasite displaying an arrogant defiance on attempt to bring them under control confounding optimistic forecasts that they would soon fade away.

These tropical diseases therefore present problems that confront not only individuals or communities, but the entire tropical region. Man has conquered space, landed on the moon and landed spacecrafts on the planet Mars. Yet despite these gigantic technological advances, man has not yet been able to conquer the oldest foe of humanity, the teeny, weenie mosquito. It is hoped that in the future a pandemic of these tropical diseases would overcome the West. Then and only then, would adequate resources be diverted towards eliminating our oldest foe, the mosquito.

During the year 2001, I intend to introduce assessment of continued professional development (CPD) referred to as continued medical education (CME) earlier. Every opportunity is offered to our members to update their knowledge and keep abreast of medical developments globally. A programme has been planned for the year comprising of a series of guest lectures, college lectures, update series, joint sessions with other professional associations and specialist campaigns of the Ministry of Health and the annual academic sessions which will be held in September this year. Those who obtain sufficient credit points will be awarded CPD Certificates of our annual academic sessions.

Health education of the Sri Lanka population cannot be over emphasized. Education of the general public is vitally important to prevent disease early. Furthermore, programmes to show the hazards of smoking, alcohol and drug abuse will be carried out on the electronic media on a regular basis this year.

The motto of our College is – CURE, RELIEF, COMFORT. We, as physicians should always endeavour to cure sometimes, relieve often and comfort always. To achieve this end should be our noble aim.