Prevention and Treatment of Leprosy Possible

by Dr AKM Shariful Islam

LEPROSY is a chronic mildly infectious disease which primarily affects the peripheral nerves and secondarily involves the skin and certain other organs. The main signs are painless non-irritant skin patches, loss of sensation and enlarged tender nerves.

It is caused by mycobacterium leprae, a slowly multiplying organism which has been grown in the foot pads of mice and in the armadillo, but never in artificial culture medium. It was discovered by Dr G H A Hansen in 1872. However, there was a superstition all over the world that this disease is caused due to a, sin or a curse on human being.

One of the oldest scourges, of mankind, leprosy is not a disease of modern civilization and industrialisation. Most probably it originated in India because it was described as "Kushtha" in "Sushruta Samhita" written in India in 600 BC.

Epidemiology

Leprosy is prevalent all over the world but mostly in the tropics and subtropics. It is unevenly distributed at the global, national and local levels. The estimated total number of leprosy cases world-wide in 1991 was 5.5 million. Between two and three million people are estimated to have significant deformities due to the disease. It is a major public health concern in Bangladesh with the average prevalence of about 1.6 per 1000, giving an estimated case load of 1,50,000. In Bangladesh approximately 60 million people live in areas where the prevalence of leprosy is more than 1 per 1000 and are therefore exposed to the risk of infection.

The contagiousness of leprosy has been greatly overexaggerated. Eighty per cent to 90 per cent of people cannot get the disease, even if exposed to it because majority are able to kill the germs that enter their body. Those at risk of developing leprosy are contacts of cases. Infant and children are mostly susceptible to the infections if they are multiple and have lepromatous leprosy. It is not possible, however, to predict from among the contacts those who will not develop the disease.

Patients with lepromatous leprosy are the main reservoir of infection, and their nasal discharges are heavily infectious. There is no animal reservoir nor proven insect vector.

Transmission

It is not known with certainly how leprosy is spread. It can only spread from a person with untreated disease to another person who has not yet got it. Infection may be acquired by inhalation or through abrasions in the skin.

The period between the entry of causative organism in the body and the appearance of definite signs of leprosy is not definitely known. The average incubation period is 2-5 years but could be as short as 3 months and as large as 40 years. The age at onset is usually 5-14 years but the youngest patient reported was 2 months old.

In adults the disease is much more common in males and in children a similar sex deference has been observed.

Pathogenesis

When mycobacterium leprae gains entrance in the body it may behave in three ways :

I. There may be subclinical infection followed by development of immunity against bacillus and destruction of organism without any disease.

II. The individual develops some immunity against organisms and forms a localised form of the disease where bacillus is rarely found.

III. The individual may be highly susceptible without any immunity and may develop the disseminated form of disease where bacilli are abundantly found.

Clinical Manifestations

Broadly speaking leprosy may manifest in one of the four ways:

I. Skin lesions (II) Neural symptoms (III) Reactional episodes and (IV) Deformities/tropic changes. The pattern of clinically detectable disease depends on the type and extent of the immune response of the individual, an understanding of which is essential for diagnosis. Early sings of leprosy are:

(I) Disturbance of sensation on the skin lesion or any circumscribed area.
(II) Decrease/loss of sweating and hair growth over the skin lesions.
(III) Thickened and/or painful nerves.
(IV) Muscle weakness or paralysis of extremities.

Late sings of leprosy are :

(I) Pain and redness in the eyes.
(II) Nasal obstruction or bleeding.
(III) Loss of eyebrows.
(IV) Inability to close eyelids.
(V) Clawing of fingers and toes.
(VI) Contracture.
(VII) Sinking of the nose bridge.
(VIII) Enlargement of breasts in males.
(IX) Chronic ulcer.

Diagnosis

Diagnosis of leprosy is based on the presence of cardinal signs of the disease which are as follows:

1. Impairment or loss of sensation over the skin.
2. Enlargement or tenderness of the superficial nerves corresponding to the skin involvement.
3. Demonstration of Acid Fast Bacilli in slit skin smear.

Anyone or more of the above cardinal signs must be present to diagnose leprosy.

Classification

Leprosy occurs in a variety of clinical forms ranging from the highly infectious lepromatous disease (with little or no immunity and uncontrolled bacterial growth) to tuberculoid leprosy (IT with a strong immune response resulting in prohibition of bacterial growth but at the cost of extensive nerve damage). In between there is borderline (BB), one which is further split into borderline lepromatous (BL) and borderline tuberculoid (BT). For control programmes, the WHO has classified leprosy into two major types "multibacillary" if the slit skin smears of a case show the presence of acid fastbacilli and "paucibacillary" if they do not. The clinical feature of these various types are distinct but a certain degree of overlap may be encountered.

Treatment

Research on treatment of leprosy has resulted in the emergence of multi-durg therapy (MDT) involving the combined use of Dapsone, Rifampicin and clofazmine which improves patient compliance, reduces the length of treatment, decreases the workload, prevents dapsone resistance and increases cost effectiveness of treatment.

Leprosy Control

The countries which have implemented MDT widely have shown that it is possible to reduce prevalence of leprosy by more than 80 per cent within four or five years. Globally MDT coverage is estimated 42 per cent. It has so far cured more than 2.8 million people in the world. Pefloxacin and Ofloxocin are two new drugs which offer the potential for increasing the effectiveness and shortening the duration of MDT regimen. World Health Assembly in May 1991 adopted a resolution to eliminate leprosy as a public health problem by the year 2000. (Prevalence loss than 1 per 10,000). Therefore to control the disease with MDT depends largely on early detection and effective treatment of leprosy as no effective vaccines are available as yet for primary prevention.

Misconceptions and prejudices about leprosy are plentiful, ranging from the disease being regarded as here dietary to a curse. The social stigma attached to it makes leprosy a major social problem. But leprosy is a treatable condition like any other infectious disease with few variations. Early detection, proper treatment and regular follow-up will ensure a good cure rate and thereby prevent the transmission as well as deformity.

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Sri Lankan Children : Best of a Bad Lot

by Mallika Wanigasundara

IN 1991, some 2.4 million children in South Asia died of pneumonia and diarrhea at the rate of 6,000 a day. These deaths could have been prevented with low-cost remedies.

STANDING straight on artificial legs, seven-year-old Kamal Ratnayake addressed the seven-nation Ministerial Conference on Children of the South Asian Association for Regional Cooperation (SAARC) held in Colombo in September.

In fluent English and with no trace of stage fright, Kamal told delegates from India, Pakistan, Bangladesh, Nepal, Bhutan, Maldives and Sri Lanka how he was born without arms and legs, what tribulations he underwent and how he overcame them.

A videofilm showed Kamal crawling limbless except for stumps. Now, Kamal can operate a computer.

Seven girls dressed in the costumes of the seven SAARC countries lit the traditional oil lamp. But while the children's performance touched hearts and buoyed hopes, it was evident that SAARC members face a long arduous journey to alleviate the plight of the 450 million children within their boundaries.

The three-day conference adopted the Colombo Resolution on Children setting out 11 goals. These include: primary education for 80 per cent of boys and 75 per cent of girls, reduction of adult and adolescent illiteracy by 1905, universal access to oral rehydration by 1996 for diarrhea control and iodised salt distribution to combat iodine deficiency, elimination of gender disparities and child labour, universal access to safe drinking water by 2,000, reduction of maternal mortality, eradication of neo-natal tetanus and poliomyelitis through immunization and reduction of severe and moderate malnutrition in children by 2000.

The resolution will be placed before the Dhaka Summit in December 1992 for endorsement.

All seven countries presented a Plan of Action for the next decade. Sri Lanka's Plan aims to reduce malnutrition among children by half by the year 2000.

Child health — a neglected area in Sri Lanka, but other developing nations fair no better.

Is was truly a children's day at the Bandaranaike Memorial International Convention Hall where the conference was held. Young people sang and danced for the visitors, provided the guard of honour, acted as ushers and made the announcements over loudspeakers.

Sri Lanka can call herself the best of a bad lot. It has a relatively low infant deaths (21 per 1,000 live births), low maternal deaths (60 per 100,000 live births), high rates of school enrolment and availability of health care as well as maternal and child care services.

According to a profile by the Ministry of Policy Planning and Implementation, 96.6 per cent of Sri Lankan mothers giving birth received pre-natal care while 87.3 per cent received assistance from a doctor, nurse or midwife at delivery.

However, malnutrition is prevalent. Eighteen to 24 per cent of babies are born underweight, 60 per cent of underfives are underweight and 65 per cent of mothers suffer anemia.

To begin with, the mother is underweight and gives birth to an underweight baby, says Ms Brita Osberg, local representative of the UN Children's Fund (UNICEF). With this bad start, the child is too weak to resists infection and gets weakened further by bouts with influenza, diarrhea and colds. Diarrhea accounts for 25 per cent of all reported deaths of children in Sri Lanka.

At the conference, UNICEF Director-General James P Grant said 2.4 million children in South Asia died of pneumonia and diarrhea — or at the rate of 6,000 daily — in 1991.

These deaths could have been prevented with low-cost remedies, said Mr Grant. He pointed out of the 50 million children's deaths likely to occur in the region in the next decade, 30 million could be prevented if SAARC countries kept their commitments. For example, political will and community effort worked together to achieve universal immunisation by 1990.

Consensus that the needs of children should get priority attention came about at the first SAARC conference on children held in New Dehli in 1986. While the conference recognised issues and made pledges, the second conference held in Colombo set goals, strategies and targets. The period 1991-2000 is SAARC's Decade for Children.

— Depthnews Asia

Half the World at Risk from Deadly Malaria

by George Javier from Manila

ALMOST half the world's population are at risk from malaria: 2.2 billion (or 40 per cent).

It is a chilling reminder that this ancient disease is still very much with us today, in the process developing resistance to drugs and insecticides. It is a mosquito-borne problem that refuses to go away.

"Each year malaria kills over 1 million people — a death every 30 seconds," Dr Hiroshi Nakajima, Director-General of the World Health Organisation (WHO) told delegates to the recent Ministerial Conference on Malaria in Amsterdam.

He stressed, however, that "malaria is a curable and preventable disease which can be controlled — but not by the health sector alone. It is everybody's business and everyone should contribute."

While over 80 per cent of malaria cases and deaths occur in Africa, it is a problem in every region of the world. Over 100 million people die from malaria each year. And it causes more than 100 million new clinical cases, many of them children.

Recent changes have contributed to the spread of the disease: population migrations, rapid urbanisation, military conflicts and civil disturbances, among others. In Afghanistan, malaria incidence has increased from 10,000 to 300,000 cases within the last seven years. Cambodia also saw the number of cases going from 200,000 to 500,000 annually.

Since ancient times, malaria has been rampant in most countries of Southeast Asia. Of the 11 countries in the region, nine are malarious: Bangladesh, Bhutan, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka and Thailand. Only Mongolia and North Korea are non-malarious.

Out of a total population of 1.2 billion in these countries, 971 million are at risk of contracting malaria, out of which 130 million are in high- risk areas. India, as the second most populous country in the world, accounts for 84 per cent of the population at risk in the region and 71 per cent of the total cases.

Resistance to the drug chloroquine is present, having lost practically all its therapeutic effect in Thailand and some parts of Myanmar. Resistance to sulfapyrimethamine (SP) has also developed in vast areas of Thailand, some part of Myanmar, Bangladesh, Bhutan and Indonesia.

The problem of resistance to DDT among mosquito carriers of the malaria parasite has been increasing in India, Indonesia, Nepal and Sri Lanka.

There has been increasing emphasis on improving the diagnosis and treatment of clinical malaria with the objective of preventing death and shortening disease episodes. Community involvement in simple drug treatment and referral of severe cases to nearby health centres has been progressing. The establishment of malaria clinics in strategic areas, particularly where drug resistance is most serious, has facilitated quick microscopical diagnosis and treatment in Thailand. This approach is being adopted in Myanmar and Nepal.

There are nine malarious countries in the Western Pacific: Cambodia, China, Laos, Malaysia, Papua New Guinea, Philippines, Solomon Islands, Vanuatu and Vietnam. Out of more than 1.1 billion people in these countries, about 115 million people live in areas where the risk of exposure to malaria is high. A further 360 million in China alone are exposed too the P *vivax* type of malaria.

In the last 20 years, most of the countries in the region (except for China and Malaysia) reported an increasing trend in the number of confirmed cases. Under-reporting masks some problems, as in Laos where there are 20,000 to 37,000 reported cases. Authorities believe there has been a serious deterioration of the situation there in recent years, with malaria cases reaching about 2 million.

Some progress is being made against malaria. WHO, through the United Nations Development Programme and the World Bank, is backing clinical trials of arteether and artether and artemether, the new drugs for treating malaria resistant to existing drugs. Both are derived from artemisinin or qinghaosu, the active constituent of the sweet wormwood plant that has been used in Chinese traditional medicine for over 2,000 years to treat chills and fevers associated with malaria.

China has experienced one of the most successful malaria control programmes. In 1953, 93 per cent of the total population lived in malarious areas. By 1990, 90 per cent of all Chinese lived in malaria-free areas or where the incidence of the disease was less than 0.1 per 1,000 people. The number of cases dropped from 2 million in 1979 to 86,600 in 1990.

The control strategy in China includes political commitment, decentralisation of management and priority to diagnosis and treatment. Community participation is encouraged, especially in mosquito control and environmental management.

For years, WHO has supported malaria research and control in Vietnam, especially in the field of epidemiological information. At present, WHO cooperates in planning and mobilisation of international assistance.

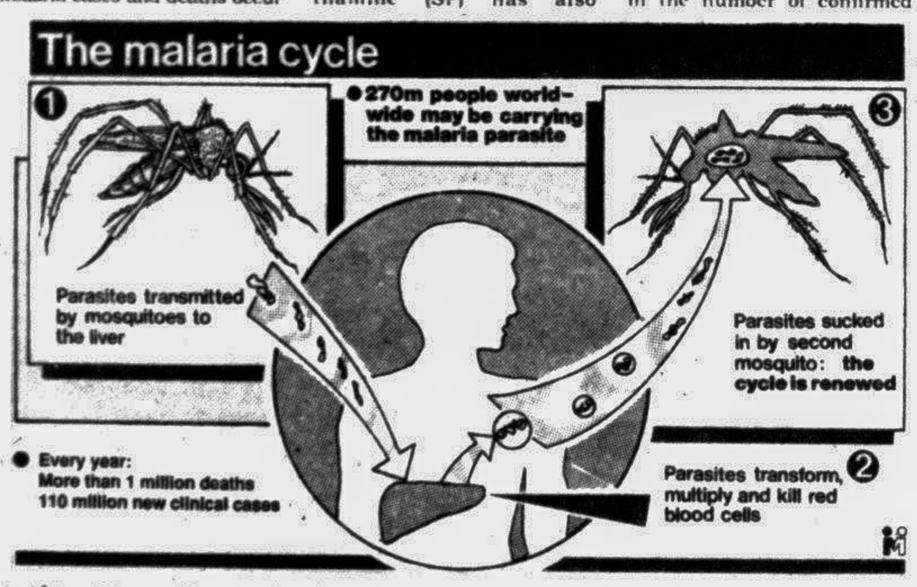
Because of widespread drug resistance and because most of the victims are adults, treatment now costs nearly US$2 per person. Vietnam produces some antimalarial drugs but foreign aid, enough to purchase about US$2.4 million in antimalarial drugs a year is needed.

There will also be a gradual introduction of bednets impregnated with mosquito repellants during the next five years. On average, this will cost an additional US$2 million per year in foreign aid. Vietnam spends about US$5 million to US$10 million a year of malaria control. Some 40 million (out of 60 million people) are exposed to malaria.

In Cambodia, about 8 million are exposed to malaria. About 500,000 new malaria cases are reported each year. Since 1990, WHO has collaborated with the government in the planning and implementation of malaria control programmes. Treatment— at US$2 per person— is as expensive as in Vietnam.

Because of the extremely severe drug resistance problems, it is necessary to attempt mosquito controls such as bednets. But Cambodia has found it difficult to secure foreign assistance, even just the US$1 million needed per year to ensure basic requirements in the treatment of malaria.

"The availability of effective and affordable treatment should be considered a human right," says Dr Nakajima. "In the case of malaria, we see prevention, not as an alternative to treatment but as a complement."



Gene Therapy : Crackdown on Culprit Genes

by T V Padma

MEDICAL researchers are painstakingly tracking down defective genes responsible for several common disorders that are expected to eventually surrender to gene therapy.

Recent advances in asthma, high blood pressure, cystic fibrosis, haemophilia-B, muscular dystrophy and cancer are renewing hopes of tackling some of the most defiant diseases in medical history.

Gene therapy strikes at the root, as scientists attempt to replace or correct the defective gene, or supplement it with a normal functional gene. The assumption behind this approach is that the genetically altered cells will proliferate and overwhelm their defective kin.

Two research teams in the United States last year received the green signal for gene therapy experiments on a limited number of human patients: one group working on cancer and the second on cholesterol. Scientists from the National Cancer Institute and National Heart, Lung, and Blood Institute jointly began work on treating cancer patients with genetically altered cells grown from their own tumours.

The researchers took tumour cells from a cancer patient and altered them to produce large quantities of an anti-tumour toxin which is believed to make the tumours more susceptible to attack from the man's own immune system.

The second group of scientists, from the University of Michigan Medical Center, will aim to insert a gene into liver cells of patients with high cholesterol, to help them remove excess cholesterol.

Genes may also soon join immunisation programmes, with researchers at the Southwestern Medical Center in Texas devising a method to directly inject genes responsible for antibody formation into a system.

"Genetic immunisation may be time-and labour-saving in producing antibodies," a report by Stephen Johston and coworkers in "*Nature*" says.

The current vaccination procedure involves injection of the purified protein which takes long time to prepare in sufficient quantities.

The scientists tested two genes _ one that codes for the human growth hormone (HGH) and another which codes for human alpha-1 antitrypsin.

A majority of mice which were inoculated in the ear with gold microprojectiles coated with either gene produced antibodies within a week. Mice vaccinated with both genes at the same time produced antibodies to both proteins.

The trials also showed that the immune reaction generated by the injected gene could be boosted. When mice that had a primary genetic injection and were producing anti-HGH antibodies were given a second dose of the gene, they showed an enhanced immune response.

Similar results were obtained in mice innoculated with the gene for human alpha-1-antitrypsin.

Gene therapy strikes at the root, as scientists attempt to replace or correct the defective gene, or supplement it with a normal functional gene. The assumption behind this approach is that the genetically altered cells will proliferate and overwhelm their defective kin.

One of the most common disorders — asthma — was in news recently when British doctors narrowed their hunt for the culprit gene.

A research team at the John Radcliffe and Churchill hospitals in Oxford had narrowed the search to just 100 of the many thousands of genes that are contained within the human body, leading the team members to predict that pinning down the exact gene may be only a few months away.

Once the gene has been found, the Oxford scientists will try to clone it so that they can study the protein it makes, and tailor drugs to counter it.

Three years ago, the team had tracked down the chromosome on which the asthma gene was located and last year they managed to locate the exact region on chromosome 11 that contains the gene, says a report from London.

An innovative Anglo-US technology is offering hopes of treating haemophilia-B with gene therapy within a few years.

In haemophilia-B, which accounts for 15 per cent of all haemophilia cases, the gene that codes for a clotting protein called Factor IX is mission or defective. The deficiency can lead to profuse bleeding both internally and externally, either spontaneously or from relatively minor injuries.

The new technology, the result of work on haemophilia-B gene by scientists at Oxford University and the University of Washington in Seattle, incorporates cloned healthy genes into the cells of haemophilia-B patients so that they can continuously make their own supplies of Factor IX.

Research on hypertension too has begun to focus on gene therapy when scientists reported last year that they could identify two chromosome gene regulating blood pressure.

A team of researchers from the National Heart, Lung and Blood Institute (NHLBI) in the United States has taken a big step toward gene therapy for cystic fibrosis when they successfully introduced a functional cystic fibrosis gene into the lung cells of live rats.

Cystic fibrosis, a hereditary disease leading to obstructive lesions, atrophy and fibrosis of the pancreas and lungs, is the most common disease in Caucasians.

If the same experiments can be successfully repeated in humans, it may correct the biochemical defect produced in their lungs by their own malfunctioning gene, says "*Science*".

To introduce the cystic fibrosis gene into the rat's lung cells, the NHLBI team tagged it to the DNA of an adenovirus which infects lung cells. Before tagging, the adenovirus DNA was suitably modified so that it does not reproduce in the lung cells.

The human cystic fibrosis gene was active in the rat lung cells for at least six weeks.

Another disorder on the hit list of gene therapy is muscular dystrophy, the wasting disease of the muscle which kills one in 3000 boys early in life.

Scientists at the Royal Veterinary College in London recently introduced the human muscular dystrophy gene into fertilised eggs of mice. They are now looking for alternative ways to deliver the gene to the crucial muscles, as current guidelines on gene therapy prohibit any genetic modification of the embryos.

The normal healthy gene makes dystrophin, a protein that is found on the outer cell membrane of the muscle cells.

Early last year, researchers from the John Hopkins University Medical School reported that they may have found a key gene for development of cancer of the colon.

— (PTI Science Service)

Breast-feeding keeps your child in sound health, there is no substitute for breast-feeding.