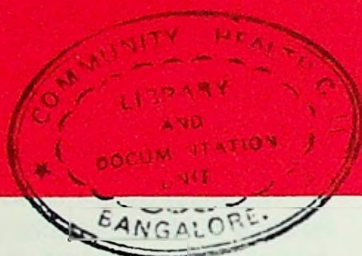




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AIDS AND THE FAMILY

The year 1994 has been designated as the International Year of the Family and this year's theme for the World AIDS Day is "AIDS and the Family". The focus will be on the effect of AIDS on families, the role of families in AIDS prevention and care of those with HIV infection and the contribution of the family to the global efforts for containment and control of HIV infection. There is a growing realisation that families whose bonds are based on love, trust, nurturing and openness are best placed to protect their members from HIV infection and give compassionate care and support to those affected by HIV/AIDS.

The family

The concept of family need not be limited to ties of blood, marriage, sexual partnership or adoption. Any group whose bonds are based on trust, mutual support and a common destiny may be regarded as a family. So religious congregations, workers' associations, support groups of people with HIV/AIDS, gangs of street children, circles of drug injectors, collectives of sex workers and networks of governmental, nongovernmental and intergovernmental organizations may all be seen as families within the over-arching family of humankind. (World AIDS Day Newsletter 1994 - No.2)

Families can play the crucial role expected of them only if they are well informed and have ready access to factual and updated information on HIV/AIDS and their role in HIV/AIDS prevention, control and management. In India interpersonal communication from health personnel has been shown to be a dependable and sustainable method of providing information. The health personnel can readily tailor the messages to suit the varying needs of the audience in any type of setting; the personal touch and repeated reiteration may in the long run, be more successful in bringing about the desired changes in lifestyle.

Most working physicians and paramedical personnel graduated long before the HIV pandemic hit the world. In this issue of the Bulletin an attempt is being made to provide a summary of current information on epidemiology, diagnosis, management and prevention of HIV infection, so that the health personnel can fulfill the role in providing accurate information on various aspects of HIV infection to the community and the families. Specific efforts are made to address and clarify some of the common but often unvoiced queries regarding apparently conflicting information on these aspects, as well as contradictions in the existing guidelines for management of HIV related health problems between developed and developing countries.

This issue commemorates the World AIDS Day (December 1, 1994)

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EPIDEMIOLOGY OF HIV INFECTION

In the eighties the science of epidemiology and art of forecasting had been extensively used to assess the magnitude and the dimensions of the HIV pandemic and devise appropriate intervention to limit adverse effect of HIV infection and contain its further spread. In the early 80s the only method available for detection of HIV infection was clinical signs and symptoms of AIDS. Most of the reported patients of AIDS were from USA, Western Europe and Sub-Saharan Africa¹. Majority of these young men and women succumbed to the disease within a year or two after diagnosis. The general public had an impression that AIDS is a uniquely devastating disease killing young men and women in their prime.

With the availability of HIV antibody kits for detection of asymptomatic HIV infection in the second half of the eighties, serosurveys on large population groups became possible. By the late 80s the World Health Organisation (WHO) started utilising available data from seroprevalence studies among asymptomatic individuals in different countries as the method of obtaining reliable data on HIV infection load². On the basis of serological studies, it is now well established that all over the world there are three major modes of transmission of HIV. Sexual transmission is the commonest (> 80%); heterosexual transmission accounts for 70-95 per cent of all sexual transmission in different countries. Parenteral (5-10%) and perinatal infection (1-10%) are the other two modes of transmission. Follow up of HIV infected persons have established there is a long (2-20 years) asymptomatic period following HIV infection; clinical AIDS represents the final immunocompromised phase which is rapidly fatal. Thus contrary to the initial impression, HIV infection is only the latest addition to the long list of Sexually Transmitted Diseases (STDs), with a long asymptomatic period; it is not a highly contagious infection that decimates young men and women in the prime of their life.

Mode of Transmission

Sexual transmission

Sexual transmission is one of the most inefficient methods of spread of HIV infection. The risk of infection is estimated to range from 1/1000 to 1/100 exposures. Women are more likely to get infected rather

than infect men. STDs and reproductive tract infections (RTIs) especially ulcerative lesions of the genitalia increase the risk of HIV transmission both in men and women. The transmission rate is higher in homosexuals especially in the passive partner and those using drugs which might disturb the immune system. Because of the large numbers of sexually active men and women (accounting approximately to 50% of the global population) and frequency of exposure, sexual transmission accounts for over 80 per cent of the HIV infection load.

Parenteral transmission

Parenteral transmission of HIV due to transfusion/infusion of blood or blood products containing HIV is the most efficient method of HIV transmission with an estimated transmission rate of over 90 per cent. Parenteral transmission also occurs following use of contaminated syringes and needles. Transmission risk following such an exposure is estimated to range from 1-5/1000 exposures. This mode of transmission accounts for the HIV infection among intravenous drug (IVD) users and majority of accidental infections within the health care delivery system. In spite of the relative inefficiency of this mode of transmission the spread of HIV infection among IVD users is very rapid because (i) the prevalence of HIV infection among drug users is high; (ii) majority of drug users share unsterilised needles and syringes when they shoot the drug; and (iii) most drug users have three or more injections per day. In any country HIV infection load due to parenteral transmission depends upon two factors viz the prevalence of IVD use in the country and the extent to which screening of blood and blood products is being practiced.

Parenteral infection due to the accidental infection in the health care delivery system from patient to patient, from patient to health care provider and health care provider to the patient has been reported both from developed and developing countries. However, these are relatively rare events.

Perinatal transmission

Perinatal infection occurs in 20-50 per cent of infants born to seropositive women. Perinatal infection rates are lower in Asia and developed countries, and among asymptomatic women; perinatal infection rates are higher in women who are viraemic (either in the early stages of HIV infection or with AIDS) or those

who had a previous HIV infected child. Some studies have suggested that the infection rates may be lower following caesarean section but this has not been confirmed by others. Contribution of perinatal infection to HIV infection load in any country depends upon prevalence of HIV infection in women, perinatal transmission rate, and birth rate.

Modes of transmission

The vast majority of all HIV infections occur through sexual intercourse. HIV can also be transmitted by infected blood or blood products, by the sharing of contaminated needles, and from an infected woman to her baby before birth, during delivery, or through breast-feeding. It is *not* spread through ordinary social contact. (World AIDS Day Newsletter 1994 - No.2)

Concept of Risk Groups

Epidemiologists use the term "risk groups" to describe group of persons at higher risk of having any disease. In case of HIV the concept of risk groups has been used to estimate the magnitude of infection in specific groups and devise appropriate intervention strategies.

The high risk groups are small groups with clearly defined lifestyles that render them readily recognisable and highly vulnerable to HIV infection. Early in the epidemic, majority of AIDS patients were from these groups. Individuals showing high risk behaviour should receive adequate counseling, screening and follow up care so that the steep rise in seropositivity in these groups can be controlled and substantial reduction in the morbidity and mortality is achieved.

Interphase group

The interphase group consists mainly of men and women who have multiple sex partners; they form the link through which infection spreads from the numerically small high risk group to the numerically vast low risk group. Prevalence of HIV infection in the interphase group is lower than that of the high risk group but higher than that of the low risk group. In communities where remarriages and divorces are common and multiple sex partners are accepted sexual norm the rate of spread of infection to the general population is higher because of the relatively large size of the interphase

group. Providing counseling, screening and treatment of STDs and promotion of correct and consistent use of condoms are measures that will slow down the spread of HIV infection to and from the interphase group.

Low risk group

The low risk group comprises individuals from the general population; majority of individuals in this group acquire HIV infection from their spouses who have multiple sex partners. Seropositivity rate in the low risk group is low initially, and rises slowly. The steepness of rise in seropositivity rate in the low risk group depends upon the size of the interphase group and prevalence of HIV infection in the interphase group. Because of the sheer size, the low risk group contributes the largest number of HIV infected persons and AIDS patients in the community. Except for perinatal and accidental transmission, HIV infection in the low risk group is usually an end infection.

Magnitude of the Problem

Over 75 per cent of all infected persons live in developing countries with very limited access to health care. In USA and Europe the HIV epidemic curve has

A worldwide problem

More than 16 million adults and one million children had been infected with HIV by mid-1994 since the start of the pandemic, according to estimates by the World Health Organization. Around four million adults and children had developed AIDS. Although Africa has borne the brunt, no continent has been spared. HIV is now spreading fast in Asia and Latin America. (World AIDS Day Newsletter 1994 - No.2)

plateaued. The Sub-Saharan Africa will also experience the plateau during this decade. Asia is currently showing the steep rise both in HIV infection rates and number of infected persons. It is expected that the number of HIV infected persons in Asia might cross those in Africa by the mid 90s. By 2000 AD 40 million persons are likely to be infected by HIV; at least half of these are likely to be women and children. The cumulative number of AIDS patients will be around 10 million. Heterosexual and perinatal transmission of

HIV infection will account for over 95 per cent of all infections and nearly 90 per cent HIV infected persons will be living in developing countries. In 1992 it was estimated that there might be about 3 million uninfected infants born to HIV infected women. Most of these live in developing countries and are likely to lose one or both parents as a result of AIDS during the 90s, and become orphans. This figure is likely to double by the mid 90s.

India

India has the unique distinction of having started the national serosurveillance for HIV in 1986 during the silent phase of the HIV epidemic not only among high risk groups but also in the low risk group to obtain information on the magnitude and major mode of transmission of HIV infection. In 1994 the estimated prevalence of HIV infection in high risk and intermediate groups is rising but in the general population, seropositivity is still low (1-2/1000). Based on the available data it has been estimated that between 2 and 3 million persons (more than 50% of them are women and children) have already been infected with HIV in India. Every year approximately 30,000 of the 27 million deliveries in India occur in seropositive women and between 6-8000 infants are perinatally infected with HIV. At present the number of AIDS patients in the country is small. However, over the next decade persons who got infected in the eighties will develop AIDS, resulting in a steep and progressive increase in the number of AIDS patients in India.

Impact of AIDS on Mortality Rate

Throughout the world AIDS has become an important cause of mortality in men and women during the reproductive age and among infants and children. In the USA, AIDS is ranked as the fourth leading cause of death in men and the sixth leading cause of death in women of child bearing age. It is the tenth leading cause of death in children between 1-4 years. Because of the lack of reliable cause and age specific mortality rates it is difficult to compute similar figures for developing countries. However, AIDS is an important cause of maternal, under five and adult mortality in Africa; Asia may face a similar situation in the next decade.

Impact of HIV on the Family

HIV infection in men, women and children has an impact not only on the affected person but also on the entire family and the community. If the breadwinner is infected, his ill health imposes a severe strain on the slender resources of the family; cost of health care and loss of wages due to ill health are the readily measurable economic dimensions; the adverse impact on social, emotional aspects and the family bonding are less readily measurable but equally distressing.

Traditionally women are the home makers and care givers. Illness in children or the husband adds to the already heavy workload of women especially in developing countries. If the breadwinner is too sick to earn, the wife has to take up this role too. With all these stresses and strains if she too falls ill, the effect on the family is catastrophic. If both the husband and wife die, the uninfected children become AIDS orphans.

An additional burden for women

Nearly half of all newly infected adults are women. But as women are the traditional caregivers, even *uninfected* women are affected by HIV when it enters a family. Women widowed by AIDS are often rejected and stripped of their belongings. (World AIDS Day Newsletter 1994 - No.2)

Early in the AIDS epidemic both in developed and developing countries, there were reports of discrimination against HIV infected persons. To some extent the social stigma associated with STD does continue to exist in respect to HIV infected persons. With increasing realisation of the vulnerability of women and children in the HIV pandemic, the family — joint/extended and relatives do come along to form the social safety net. The neighbours, colleagues at the work place and social workers in the neighbourhood extend a helping hand as and when needed to the extent possible. Thus HIV infection has an indirect impact on a much larger number of persons than the infected person alone.

The ripple effect on families

Every day, around 6000 people are newly infected with HIV. But several times this number will be newly *affected* by HIV every day through the impact on each infected individual's family and community. (World AIDS Day Newsletter 1994 - No.2)

NATURAL HISTORY OF HIV INFECTION

HIV infection is a unique STD without local genital manifestation at any time during the infection but with grave systemic manifestations. Due to the lack of local symptoms infected persons remain totally unaware that they have been infected. Four to six weeks after initial infection these persons may get fever at times with lymphadenopathy and rash. The symptoms resemble common viral fever or infectious mononucleosis and disappear with or without therapy. This episode is called as "sero-conversion illness" because it coincides with the appearance of a detectable amount of HIV antibodies.

Following the sero-conversion illness, HIV infected persons have a long but unpredictable asymptomatic period lasting for 2-20 years (average 10 years). Good nutrition, freedom from infection, and lack of exposure to drugs or unhygienic environment are the factors which are associated with a longer asymptomatic period. During the asymptomatic period HIV antibody titres remain high; the CD4, CD8 counts as well as CD4/CD8 ratio remain normal. The person remain apparently healthy and can function normally. These individuals are, however, infected and are capable for transmitting HIV infection through sexual, perinatal or parenteral routes. The asymptomatic individuals who are unaware that they are infected play a major role in transmission of HIV infection by all modes in any community.

After a variable period of time the immuno suppression, characteristic of the late stages of HIV infection, begins. There is a progressive fall in CD4 counts; currently the CD4 count is being used in many centres for defining persons with AIDS; cut-of points of CD4 count of 500 or 200 have been used by different centres. With the onset of immunosuppression the infected person falls prey to repeated episodes of pathogenic or

opportunistic infections. The pattern of infection among the immunosuppressed HIV infected individuals depend upon the presence of infection in the community, earlier infection experience of the person and the immunisation status.

Tuberculosis is one of the most common infections among HIV infected persons in both developed and developing countries. Clinical manifestation of tuberculosis may be typical or atypical; lesions are often extrapulmonary or widely disseminated. These patients respond well to short course chemotherapy. However, recurrences and relapses are frequent. Repeated administration of chemotherapeutic drugs may result in an alarming rise in multi drug resistant strains which may pose a grave threat to effective treatment of tuberculosis both among HIV infected persons and in the general population.

Repeated infections of the skin, respiratory and gastro-intestinal tracts are seen in the majority of AIDS patients. Infections may be due to a wide variety of pathogenic and opportunistic organisms — bacteria, fungi, parasites and viruses. Common bacterial infections with *Shigella* or *Salmonella* may be associated with severe bacteraemia and high mortality rates. Mycobacterial infections with *Mycobacterium tuberculosis* in the tropic and *M. avium intracellulare* in the temperate zones are common. Candidiasis is the most common fungal infection. Parasitic infections include amoebiasis, giardiasis and cryptosporidiosis. Viral infections due to a variety of organisms are also reported in AIDS patients. All these infections tend to be invasive, severe and present with atypical manifestations. Each episode readily responds to effective antibiotics/chemotherapy; but both severity and repeated episodes take their toll.

Abnormalities of the nervous system leading to progressive neurological deterioration and behavioural changes are known to occur both in adults and children. These are very often not recognised as being manifestations of HIV infection especially in IVD users. However, retrospective analyses have shown that several of the behavioural abnormalities including suicidal and homicidal tendencies might in fact be attributable to these CNS changes. In paediatric AIDS neuro-psychological regression might be a major distressing manifestation in children who survive beyond two years of age.

CASE DEFINITION OF AIDS

Over the last decade there had been several efforts to evolve a case definition of 'AIDS' within the existing limitations of HIV testing facilities and other laboratory facilities. The case definition of AIDS is an essential prerequisite for evolving and evaluating appropriate therapeutic regimens for the care of AIDS patients as well as building up a AIDS surveillance system. For the purposes of surveillance WHO has recommended that an adult or adolescent (> 12 years of age) is considered to have AIDS if a test for HIV antibody gives a positive result, and one or more of the following conditions are present:

- (i) > 10 per cent body weight loss or cachexia, with diarrhoea or fever, or both, intermittent or constant, for at least 1 month, not known to be due to a condition unrelated to HIV infection
- (ii) cryptococcal meningitis
- (iii) pulmonary or extrapulmonary tuberculosis
- (iv) Kaposi's sarcoma
- (v) neurological impairment that is sufficient to prevent independent daily activities, not known to be due to a condition unrelated to HIV infection (for example, trauma or cerebrovascular accident)
- (vi) candidiasis of the oesophagus (which may be presumptively diagnosed based on the presence of oral candidiasis accompanied by dysphagia)
- (vii) clinically diagnosed life-threatening or recurrent episodes of pneumonia, with or without etiological confirmation
- (viii) invasive cervical cancer

The major feature of this expanded surveillance case definition is that it requires a HIV serological test, and includes a broader spectrum of clinical manifestations of HIV such as tuberculosis, neurological impairment, pneumonia, and invasive cervical cancer³. It is simple to use and has a higher specificity than the earlier (Bangui)WHO case definition.

DIAGNOSIS OF AIDS CASES

Clinical diagnosis of adult AIDS in developing countries is difficult; chronic undernutrition is not uncommon especially in the poorer segments of the population. Weight loss associated with persistent cough

(tuberculosis) and chronic diarrhoea (amoebiasis, giardiasis) are common. Even though HIV antibody tests are available in major treatment facilities, it is possible that at the moment a number of AIDS patients are being missed in India and are treated for the opportunistic/pathogenic infection and/or for undernutrition inevitably resulting in underdiagnosis of AIDS cases. With increasing awareness about AIDS, the pendulum may swing towards over diagnosis. However, the problem of under or over diagnosis is unlikely to materially affect the patient management in India, because the treatment for pathogenic/opportunistic infections and efforts to improve nutrition are the same, irrespective of the HIV status of individual.

DRUGS AND VACCINES FOR TREATMENT OF AIDS

Initial enthusiastic reports about the usefulness of azidothymidine (AZT) have not been substantiated by subsequent studies; at best AZT prolongs the asymptomatic phase or the longevity in AIDS patients by a few months. Use of other virucidal drugs like dideoxyinosine (DDI), singly or in combination, or use of virucidal drugs with immunomodulators have been attempted without any substantial reduction in the side effects or improvement in the salvage rate. The cost of the drugs as well as the cost of the clinical and laboratory monitoring are prohibitively high and very few in the developing countries can afford them.

Intensive global research has been focussed on finding a therapeutic or prophylactic vaccine for AIDS. So far about 15 vaccines have reached the Phase I clinical trial stage. The efficacy of these vaccines in terms of prevention of HIV infection or prolonging the asymptomatic period of HIV infection or prolonging the survival in AIDS patients is yet to be ascertained in human beings. Given the difficulties in the preparation and testing of vaccines, the antigenic variability of HIV, the intracellular nature of the organism, the wide and unpredictable variability in the course of HIV/AIDS, it is unlikely that any therapeutic or prophylactic vaccine for HIV/AIDS will be available for clinical use within the next decade.

MANAGEMENT OF AIDS CASES

Public concern regarding AIDS stems from the knowledge that there is no curative therapy or prophylactic vaccine for this infection. HIV *per se*, does not

kill but infections and malignancies that occur in these immunocompromised persons are responsible for the suffering and death. Global research efforts have resulted in better diagnostic tests and effective drugs (though many do have severe side effects) for treatment of several pathogenic or opportunistic infection seen in AIDS patients. In developed countries where CD4 monitoring is done on all seropositive persons a fall in CD4 count below 500 even in the absence of any clinical signs, is an indication for institution of antiviral therapy. It is unlikely that in India there will be widespread laboratory based monitoring of immune status, or use of AZT and other virucidal drugs because these are not affordable.

HIV and AIDS

AIDS (acquired immunodeficiency syndrome) is the late stage of infection with the human immunodeficiency virus (HIV). AIDS can take more than ten years to develop, and most people die within three years of it being diagnosed. (World AIDS Day Newsletter 1994 - No.2)

Guidelines for Hospitalisation

In the Indian context it is essential to evolve appropriate guidelines for hospital admission of persons with HIV/AIDS so as to ensure that health care services do not get overwhelmed by trying to provide care for HIV/AIDS cases and that persons with all other ailments do get due attention. AIDS patients require hospitalisation for treatment of acute pathogenic or opportunistic infections and treatment of acute life-threatening emergencies. Many will require emergency or elective surgical intervention. Malignancies occurring in AIDS patients would require appropriate management.

Nutritional support in HIV infection

Nutritional support is needed in HIV infected individuals to (i) maintain optimum nutrition during the long asymptomatic period; (ii) prevent further deterioration of nutritional status during acute episodes of infection in AIDS patients; and (iii) improve nutritional status during the 'stable' symptom-free period in AIDS patients.

It is relatively easy to achieve and maintain optimum nutritional status in asymptomatic seropositive

individuals. This goal can be achieved by minimal inputs into health care, counseling and health education both in developed and developing countries. It is possible that good nutrition and freedom from common infections may prolong the asymptomatic period.

Once clinical symptoms appear it is very difficult to maintain optimal nutrition. However, efforts should be made to prevent further deterioration by ensuring adequate intake of a well balanced diet to meet the increasing nutrient requirement due to infections. Vitamins and mineral supplements in appropriate doses to meet the increased requirements may be given. Parenteral nutritional support should be resorted to for short period only if there are clear indications.

Care of chronic illnesses

During the chronic and terminal phases of their illness, AIDS patients require symptomatic and supportive treatment. The management of this phase of illness can be readily undertaken at home, with the hospital outpatient visits providing the necessary medical monitoring and therapy. The patients are much more comfortable at home in the midst of the family; the family can provide them with the emotional and psychological support as well as physical comforts that is needed. There are, however, situations where support from the family may not be available. Such patients have to be provided with care so that they can spend the last days of their lives in some comfort in hospice like facilities. Special efforts may be made to explore feasibility of involving non-governmental/voluntary agencies for providing this type of care.

SCREENING FOR HIV INFECTIONS

Testing for HIV infection has been a controversial issue. In developed countries counseling and informed consent of the individual prior to HIV testing are mandatory and confidentiality of results is strictly maintained⁴. Under the existing conditions of illiteracy, social and other taboos obtaining informed consent from the person undergoing HIV testing in India poses several problems. The Expert Group of the Indian Council of Medical Research (ICMR) discussed the issue and recommended that in the Indian context HIV infection should be considered as a sexually transmitted disease or transfusion transmitted disease. The clinician will decide on the basis of clinical assessment whether



HIV testing is required for an individual patient, in exactly the same way as they would decide on any other laboratory investigation of patients under their care. All donors of semen and organs should be screened for HIV infection to prevent iatrogenic infection in the recipient. All donated blood should be screened for HIV antibodies; this is also mandatory for blood used for blood product manufacture. The testing facility should be made available to those who voluntarily seek testings⁵. HIV testing may be done for research purposes on approved research protocols after obtaining clearance from concerned institutions. Health service personnel need not be screened for HIV antibodies because patients are not at risk of acquiring HIV infection during the course of health care delivery related contacts with health personnel. Health care seekers need not be screened for HIV infection because they are unlikely to infect health care persons or other health care seekers provided universal precautions for infection control are observed.

CARE OF SEROPOSITIVE PERSONS

All HIV infected individuals require counseling because of the social stigma attached to the disease and the invariably fatal outcome of the infection. They require health monitoring. This can be done on an outpatient basis. Health education to infected persons and their families is essential for reducing the risk of transmission of infection. All HIV seropositive persons should be taught simple precautions against common infectious diseases prevalent in the community, because reduced morbidity due to infections may prolong the asymptomatic phase of the disease. During the asymptomatic period, seropositive persons may require health care for problems related or unrelated to HIV infection. All HIV infected persons should receive the prophylactic and therapeutic care required. Elective and emergency surgical procedures should be provided, as and when required. However, invasive palliative procedures such as renal dialysis for chronic renal failure may not be indicated in these individuals.

HIV INFECTION AND PREGNANCY

HIV Infection - Pregnancy Interactions

Contrary to the initial reports, pregnancy does not have any adverse impact on course of HIV infection. HIV infection, does not appear to have any adverse

effect on health of the pregnant women, course of pregnancy, labour, puerperium or lactation.

HIV readily crosses the placental barrier. The consequences of intrauterine infection on the foetus vary depending upon the period of gestation at the time of infection, degree and duration of viraemia. Increased abortion rates have been reported from Africa but it is not clear whether this is due to HIV infection or to other confounding factors. The available minimal data mainly from the European collaborative study indicate that use of AZT in early pregnancy is not associated with any increase in the abortion rates or congenital malformation rates. Data from collaborative studies in the USA indicate that use of AZT in the second and third trimesters of pregnancy is not associated with any adverse effect on the baby except for a higher prevalence of anaemia. Data, however, are insufficient to draw any firm conclusions regarding the absence of any adverse consequences on the foetus or beneficial effect in terms of reduction in the intrauterine transmission rate. Maternal HIV infection is associated with a higher rate of premature delivery, intrauterine growth retardation and higher perinatal mortality rates^{6,7}.

Screening for HIV in Pregnancy

Screening for HIV during pregnancy along the lines of screening for syphilis during pregnancy has many ardent advocates. The major reason for screening for STD like syphilis in pregnancy is to provide therapeutic intervention to prevent intrauterine infection. This justification does not exist for HIV. In many developed countries counseling women about STDs and HIV and, after obtaining informed consent screening them for STD including HIV has been included as a part of the "routine" antenatal care. In these situations there are adequate facilities for post test counseling and care of women if any are found to be seropositive^{6,7}. In India such facilities are neither available nor affordable. Counseling for medical termination of pregnancy (MTP) in early pregnancy in parous seropositive pregnant women may provide the rationale for HIV screening in women who report early in pregnancy in our country. However, screening of all pregnant women is impossible because majority do not attend antenatal clinics; screening facilities are neither available nor affordable. So most HIV infected asymptomatic women will continue to remain undetected.

Management of Pregnancy in Seropositive Women

The fate of the unborn child is the major reason for concern regarding HIV infection in pregnancy. To prevent these potential calamities, MTP may be done in the first trimester, should the patients desire it. However, many of the known seropositive women may not opt for it especially if they do not have a living child.

Women who want to continue pregnancy should be provided with adequate, appropriate, antenatal care. In the USA in woman who opt to continue pregnancy, the prophylactic use of AZT is considered especially with falling CD4 count⁸; many obstetricians prescribe prophylactic chemotherapy against pneumocystis pneumonia. In developing countries like India, seropositive women who opt to continue pregnancy are provided with antenatal care; specific efforts are made to promptly diagnose and treat any opportunistic or pathogenic infections in these women. Routine CD4 cell counts, prophylactic chemotherapy against infections in immunocompromised individuals and prophylactic therapy with AZT or similar virucidal drugs are not possible or affordable.

During labour specific efforts may be taken to reduce any invasive procedures such as scalp vein blood sampling, use of scalp electrodes to monitor foetal heart rate, to reduce the risk of transmission of infection to the foetus during labour. In the Indian context caesarean section is associated with maternal consequences not only in the present pregnancy but also in the subsequent conception. Hence normal vaginal delivery will continue to be the mode of delivery in HIV infected women who do not have any specific indications for caesarean section until such time as there is unequivocal proof that the risk of HIV transmission is lower with caesarean section. Stringent precautions should be taken to prevent accidental spread of HIV infection while providing health care especially during delivery. Specific efforts have to be made to keep appropriate provisions for looking after the low birth weight neonates.

HIV AND BREAST FEEDING

HIV infection has no adverse effect on lactation and lactation has no adverse effect on the course and outcome of HIV infection. HIV has been isolated from breast milk. HIV antibodies are also present in breast milk

and their presence may provide some protection against transmission of HIV infection through breast milk. Estimated risk of transmission of HIV infection through breast milk is between 1-3 per cent of all the perinatal infections.

Breast Feeding in Seropositive Women

All available data suggest that breast feeding will protect HIV infected infants from other infections and may prolong the survival period. There are no tests by which infected infants could be identified at birth. Unless all infants born to seropositive mothers are breast fed, HIV infected infants will be denied the benefit of breast feeding. In view of this it is essential to encourage all seropositive women to breast feed. In India, the advantage of breast feeding by far outweighs the small potential risk of HIV infection through breast feeding; this is especially important in seropositive mothers from low income groups among whom, breast feeding holds the key for infant nutrition, growth, relative freedom from infection and survival^{9,10}. Therefore, in the Indian context, breast feeding by the biological mother is to be advocated for all infants born to seropositive women.

Breast Feeding in the HIV Epidemic

In India breast feeding is essential for infant survival and growth especially among the poorer segments of the population. Hence breast feeding by the biological mothers should continue irrespective of the HIV infection status of the mother or infant, known or unknown. Promotion of breast feeding should continue to be the national policy^{9,10}.

HIV INFECTION AND IMMUNISATION

Increasing prevalence and awareness of HIV infection has led to concern about efficacy and safety of immunisation of the infants born to seropositive mothers and queries about the Universal Immunisation Programme (UIP) in the absence of any information on the HIV status of the majority of infants.

Immunisation in Seropositive Infants

HIV infected infants are apparently healthy and do not have any immunodepression at birth. They usually remain asymptomatic during the first six months

of life. They respond normally to immunisation administered during the asymptomatic period. Experience with inactivated vaccines given to HIV infected children indicate that these immunisation are free from major short or long term side effects. Immunisation might offer some protection against the common infections during infancy in HIV infected children when immunodepression occurs. It is therefore essential that all infants born to seropositive mothers should receive all the vaccines on schedule. Special attention should be given to ensure that these infants receive BCG vaccination soon after birth, because (i) BCG vaccination cannot be given to infants once immunodepression sets in, and (ii) tuberculosis is one of the most common pathogenic infections in HIV infected infants in developing countries like India. If for any reason BCG vaccination was not administered at birth it should be administered as soon after birth as possible. **However, BCG vaccination should not be administered in seropositive infants if they have become symptomatic for AIDS.**

It is essential to ensure that all seropositive infants receive DPT, polio and measles vaccines on schedule. If given on schedule most of the infants would have completed their immunisation prior to onset of symptoms. If seropositive infants had not received immunisation on time and have become symptomatic, it is essential to give them DPT, polio and measles vaccine, because (i) all the available data indicate that in immunocompromised HIV infected infants risk of natural infections is greater than the risk of immunisation even with live attenuated vaccines (except BCG); and (ii) so far no major adverse effects of vaccination on HIV infected infants have been reported. Some paediatricians advocate that in symptomatic HIV seropositive infants killed polio vaccine may be used instead of OPV.

Universal Immunisation Programme and HIV Epidemic

The WHO Expert Group on Immunisation has recommended that there is no need to modify any of the existing guidelines for the Universal Immunisation Programme; all asymptomatic infants irrespective of the fact that HIV status of the mother or infant is not known, should receive all vaccines both live attenuated and killed as per the existing schedule⁹. The advent of the HIV infection only calls for continued vigorous implementation of UIP even after the advent of the HIV epidemic. It is essential that the immunisations are

administered on schedule so that all infants receive all the immunisations except measles before six months of age when almost all the HIV infected infants are in the asymptomatic phase.

HIV AND CHILDREN

During the first six months of life, growth and morbidity of HIV infected infants is similar to uninfected infants from the same community; subsequently repeated infections and growth faltering appear. Paediatric AIDS is characterised by failure to thrive, poor weight gain/actual weight loss, hepatosplenomegaly, recurrent fever, respiratory infection, diarrhoeal diseases and bacterial or fungal infections of the skin.

Because of the limitations of the HIV screening programme in women, the majority of seropositive infants in India will remain undetected during infancy. Growth monitoring and investigation of infants showing growth retardation and repeated infections is likely to be the common method by which paediatric AIDS patients are detected in India.

Care of HIV Infected Infants

Physicians in developing countries advise admission only for treatment of life threatening infections and malignancies in children with AIDS. Monitoring of HIV infected children, providing appropriate care for repeated episodes of pathogenic/opportunistic infection are best done at home with the help and cooperation of the family members. Children are certainly happier at home, than in the crowded hospital wards among strange, ill children. Hospital admission for only gravely ill children is a useful strategy to ensure that inpatient beds are not all taken up in the care of chronically ill children with AIDS and adequate beds are available for care of children suffering from other illnesses.

Children pay a growing price

Increasingly, children are paying the price of AIDS — either by being infected themselves or through the effect of AIDS on other family members. They may lose their parents and have to live on the streets if other relatives cannot or do not step in with support. (World AIDS Day Newsletter 1994 - No.2)

It is possible that some of the chronically ill paediatric AIDS patients do not have their parents or any family to look after them. It is essential that some provision is made for care of such children in hospices.

AIDS Orphan

There have been reports of discrimination and abandonment of AIDS orphans, from some developed countries and urban areas of some developing countries. Faced with the lack of support from the traditional family and the social security network, AIDS orphans will face severe deprivation and contribute to a steep rise in under nutrition, morbidity and mortality during childhood. The majority of the world's AIDS

An extra threat in the 1990s

Many families in the 1990s are disrupted by political upheaval, civil unrest, migration, and other factors. For millions of them, HIV is an extra threat. If a breadwinner falls ill with AIDS, they face losses of income and sometimes food supply. (World AIDS Day Newsletter 1994 - No.2)

orphans live in Sub-Saharan Africa. During the eighties in several countries in Africa life had undergone major disruptions due to political upheavals, wars and migration; millions had to cope with the HIV epidemic on the top of all these. When the breadwinners — men and women in the reproductive age were lost, the family and community lost the little income they had and even food supply was threatened. In the midst of all these calamities, in these rural communities there were many whose immediate family members were dead or unable to look after HIV affected men, women and infants, or AIDS orphan. The community shared what little they had and attempted to look after these ill and destitute persons. These reports prove that poverty and illiteracy are no barriers to sharing what little they have and caring for others. In the context of developing countries building up a community and familial support network appears to be the culturally most appropriate, most effective and least expensive method of providing care to AIDS orphans.

PREVENTION OF HIV INFECTION

It is obvious that at the moment there are no effective drugs or vaccines for prevention or treatment

of HIV infection; nor is one likely to become available in the foreseeable future. Under these conditions it is essential that efforts are directed to inform the population about the urgent need for lifestyle changes so that there is a reduction in the risk of HIV infection. Specific efforts have to be mounted to prevent sexual, perinatal, parenteral and accidental infection with HIV.

Prevention of Sexual Transmission

Sexual transmission is the commonest mode of HIV transmission and hence deserves maximum efforts for prevention. Sexual transmission can be prevented by abstinence or fidelity between uninfected partners. There are, however, situations in which the persons may be unable to give up multipartner sex and sex with persons whose infection status cannot be assessed. Under these conditions these persons may be taught to correctly and consistently use a condom so that the risk of infection can be reduced^{10,11}.

Sexual transmission can be prevented

Sexual transmission of HIV can be prevented by abstinence, fidelity between uninfected partners and safer sex, which includes non-penetrative sex and sex with condoms. Children need education about AIDS prevention *before* they become sexually active. Everyone needs easy access to condoms in case of need. (World AIDS Day Newsletter 1994 - No.2).

Condom

Condom usage for STD prevention was promoted in the preantibiotic era when effective treatment for STDs was not available. The advent of HIV infection led to a revival of a massive programme for condom promotion all over the world. Available data indicate that good quality condoms are correctly and consistently used by motivated couples to provide substantial but not total protection against STDs. However, in the settings where potential risk of STD/AIDS transmission is the greatest, the quality of the condoms as well as its correct use is likely to be suboptimal. In India, where the acceptability and what is even more important, use effectivity of the condom is low even in the Family Welfare Programme, it might be unrealistic to

depend heavily on its protective effect against HIV infection. Two other implications of advocacy of condom use have to be kept in mind, (i) because of lack of awareness sporadic and incorrect users may feel that they are protected and continue to indulge in casual sex; and (ii) inherent method failure with condom (between 5-20%) has not been clearly explained and hence when persons who have been using condoms consistently develop HIV infection there might be a backlash against condom use.

Intrafamilial use of condom has been advocated as a method to prevent sexual transmission to the spouse from a potentially infected partner. Studies carried out in Africa indicate that this is not a feasible proposition; request for condom use has been reported to lead to marital discord because it is interpreted as being due to the suspicion of infidelity.

Condom use in seropositive couples

If both the partners are found to be seropositive there is no need for them to use a condom during sexual intercourse; however, specific efforts should be made to prevent vertical transmission by providing effective contraceptive care. If one of the spouses is seropositive they should be counseled and taught to correctly and consistently use condoms.

Condom promotion in the general population

In India it is estimated that there are over 200 million sexually active couples. Even if all the population accept and are willing to correctly and consistently use condoms, it will be an enormously expensive and logistically difficult task to supply billions of condoms every year, year after year for several decades. Considering all these factors, it might be preferable to advocate a mutually faithful monogamous relationship as the best and culturally most readily acceptable method of prevention of HIV infection in the Indian population. In couples who are known to have multiple sex partners, correct and consistent use of condoms may be advocated as a method to reduce the risk of HIV transmission.

Prevention of Vertical Transmission

So far prevention of sexual and parenteral infections had been the focus of most of the HIV/AIDS prevention programmes. However, from now onwards special attention

has to be paid to the prevention of vertical transmission because in the populous developing countries where over 75 per cent of all the HIV infected persons live, birth rate remains high. Unless adequate emphasis is given for contraceptive care, these countries will, over the next decade, have to bear the burden of having over 90 per cent HIV infected children and AIDS orphans. It is therefore imperative that contraceptive care aimed at minimising these problems receives the attention that it deserves in the AIDS Control Programme.

Contraception HIV interactions

Among all the contraceptives only the correct and consistent use of the latex condom has been shown to prevent HIV infection. Diaphragm and cervical cap do not protect against HIV infection. There is as yet no clear cut evidence that the female condoms protect against HIV infection. Several spermicides including Nonoxinol 9 have been shown to have anti HIV activity and inhibit multiplication of HIV *in vitro*; however, unequivocal proof for their efficacy *in vivo* in the range of concentrations likely to be seen in different users, is not available. It is possible that when used along with a latex condom these agents may provide more effective protection than when either is used alone. So far no adverse interactions between any of the currently used contraceptives and HIV infection have been reported. The fear that intra uterine devices (IUDs) and hormonal contraceptives might have adverse interactions in HIV infected persons has not been substantiated^{9,10}.

Contraception for seropositive women

It is imperative that safe and effective contraceptive care is provided for all seropositive women because of the known adverse consequences of HIV infection during pregnancy. The choice of a contraceptive method for the individual should take into account risks and benefits of the contraceptive method, lifestyles and contraceptive preferences of the individual, availability of contraceptives and health care facilities. If the spouse/sex partners of the seropositive person is seronegative, the couple should be instructed that in addition to the contraceptive of their choice they should use condom to prevent HIV transmission.

Vasectomy or tubectomy appears to be the ideal method of contraception for seropositive men and women who have completed their families. In case one of the

partners is not infected, it is essential that the infected partner undergoes tubectomy/vasectomy and the couple consistently uses condom to reduce the risk of sexual transmission. This policy is advocated so that the uninfected partner can remain free of HIV infection and has the option of remarriage and subsequent child bearing. If the couple prefers an IUD, it can be inserted provided there are no clinical contraindications for IUD use. Similarly oral contraceptives (OCs) or other hormonal contraceptives can be administered to those who opt for it. It is essential that all these women are followed up and continued contraceptive use to prevent vertical transmission, is ensured¹⁰.

Contraceptive care during the HIV epidemic

In India, in the majority of instances, contraceptive care will have to be provided without any knowledge of the HIV infection status of the individual. The WHO Expert Group on Contraception and HIV Infection has recommended that under these circumstances contraceptive care can continue to be provided according to the existing guidelines, even though the HIV status of the person is not known¹². Thus the national policy of providing appropriate contraceptive care to all eligible women can be pursued without any modifications. In fact advent of HIV infection provides yet another reason — prevention of vertical transmission — for vigorous implementation of the National Family Welfare Programme.

Prevention of Parenteral Transmission

Blood product screening

In India mandatory screening prior to blood product manufacture is a statutory requirement. Screening of blood prior to transfusion has been initiated in major cities; extension to smaller cities is being taken up in a phased manner. This effort is coupled with efforts to modernise blood banks including provision of adequate component separation units, so that adequate appropriate quantities of the safe blood /blood component are available for transfusion. Efforts are also underway to educate the public on the need for voluntary blood donation to meet the needs.

Prevention of HIV infection in IVD users

Parenteral infection in IVD users is another aspect that had received attention. It is not very easy to

approach this group and attempt to change their lifestyle. Efforts to reduce the risk of HIV infection include (i) counseling not to share syringes and needles; (ii) sterilise the syringes and needles through use of bleach solution; (iii) needle exchange programmes; (iv) efforts to change over to oral drug use; and (v) efforts to coordinate with the existing drug deaddiction programmes to wean IUD users from use of drugs.

In these efforts the family has a crucial role to play; the early diagnosis of drug use, screening of drug users for HIV infection, counseling them on HIV infection prevention and drug deaddiction all depend on the close cooperation of the family; success in these efforts is mainly dependent upon the continued support from the family.

Prevention of accidental infection due to injections

In most of the developed countries presterilised disposable syringes and needles are widely used. These are safely disposed soon after use. In India the culture of ensuring safe disposal of disposable material including syringes and needles does not exist. Many health care workers discard the used disposable syringes and needles in cardboard cartons assuming that they will subsequently be "safely" disposed. Anecdotal reports on reuse of disposable syringes and needles which had been casually dumped by the user, picked up and reused after washing without even putting them in a steriliser because they may become distorted by the heat, abound in India. In view of this it is preferable to use glass syringes and needles and ensure effective sterilisation of them. HIV is a fragile virus. Sterilisation of syringes and needles can readily be achieved by either autoclaving at 121°C for 20 min or boiling in water for 20 min. This simple safe procedure constitutes the surest way for prevention of accidental infection by any organism including HIV. If for any reason disposable syringes and needles are used, the health care worker should separate the syringe from the needle, separate the barrel from the piston and drop all the three into the bleach solution. This would ensure that these syringes and needles will at least not transmit infections even if reused.

Prevention of Accidental Infection

Fear of accidental infection with the HIV does exist in all segments of society including patients attending hospitals, health care personnel and the

family members providing care to persons with HIV/AIDS; this fear influences their behaviour towards individuals known to be infected with HIV. With the advent of the HIV epidemic specific efforts have been made to strengthen the infection control measures in many hospitals to prevent accidental infection from patient to patient, patient to health care provider and health care provider to patient and to allay the apprehensions about accidental HIV infection in the health care set up. At the same time the family members of person with HIV/AIDS are reassured that living with a HIV infected person is safe and there is no threat of infection to the other members.

HIV is transmitted mainly through blood and genital secretions. Many patients in the hospital require invasive investigations and therapeutic procedure or have open wounds; hence the chances of exposure to blood and body fluids are higher in the hospitals. This risk can be minimised by taking appropriate infection control procedures. In the home settings, invasive procedures are not carried out and hence risk of exposure is lower. However, all the family members of persons with HIV infection are taught to use barrier precautions and washing procedures identical to those followed in the hospital while providing care.

Prevention of accidental hospital infection

In the preantibiotic era cleanliness, disinfection and antisepsis were the hallmark of any hospital ward. With the advent of antibiotics the fear of infections faded and the time, effort and money spent on infection control in health care services dwindled. The rising incidence of hospital acquired infections (HAI) and hepatitis B infection among the health care providers sounded the warning bell on the need to tighten infection control measures; advent of HIV infection provides yet another warning and an opportunity to correct the existing lacunae. It is essential that energetic steps are taken to minimise if not totally prevent accidental HIV infection because (i) ethically health care providers cannot allow patients under their care to get HIV infection while undergoing treatment for other ailments; (ii) effective infection control measures are essential to allay patients fears regarding accidental HIV infection and ensure that both HIV infected and uninfected persons continue to fully utilise available health services; (iii) along with blood and blood product screening effective infection control represents an area where health workers can by

themselves effectively ensure, arrest of further spread of HIV infection; and (iv) the rapid and effective implementation of hospital infection control may serve as one of the best health education measures because patients, their relatives and friends will see the transformation brought about by the advent of HIV infection in the hospital scenario. The change in behavioural pattern of the health care personnel may reinforce effectively the messages seeking behavioural changes in the population to prevent spread of HIV infection.

The only method by which the risk of accidental infection can be minimised is to assume that every patient seeking health care is infected with HIV and take proper care while handling every patient. Rigorously implementing "universal precautions" for prevention of accidental infection is the only way to allay the fear of accidental HIV infection. The entire range of health service activities regarding asepsis, antisepsis, disinfection and sterilisation need be streamlined and strengthened¹³⁻¹⁵.

Infection control does not require sophisticated equipment, expensive chemicals or increase in manpower. It requires correct and consistent use of inexpensive, time tested methods of chemical disinfection and sterilisation. The key to infection control lies in the motivation and dedication of all health care workers and sustained cooperation from the health care seekers and the community. Special attention should be paid to provision of adequate numbers of autoclaved syringes, needles, gloves, aprons, instruments and autoclaving facilities. HIV is a fragile virus readily destroyed by heat and common disinfectants. For sterilisation of syringes, needles and instruments, autoclaving for 20 min at 121°C is the time tested, safe and certain method^{13,14}. Sharp instruments, endoscopes and other delicate instruments that cannot be autoclaved may be disinfected using 2 per cent glutaraldehyde solution. Accidental infection due to exposure to infected blood, liquor and vaginal secretions should be prevented by use of aprons, gloves *etc.* Commonly used barrier precautions include; (i) plastic aprons and cotton or paper masks in situations where splashes of blood and body fluids are anticipated such as in labour rooms; (ii) plastic gloves while handling specimens of blood in the laboratory and while doing venepuncture and similar situations where sterile precautions are not needed¹³⁻¹⁵.

Accidental infection during washing of instruments and linen contaminated with blood and body fluids appears to be a rare event. In the developed countries several steps including soaking of all instruments and linen in appropriate chemical disinfectants prior to washing, providing gloves and other barrier methods to those who do the washing and mechanisation of washing procedure through use of appropriate washing machines have all been tried. In the Indian context the easiest and the most reliable method for ensuring that accidental infection does not occur during washing of instruments and linen is to soak them for 1-2 h in appropriate chemical disinfectants prior to washing. Disinfection can be achieved by the widespread use of hypochloride solutions¹⁴.

It is essential to ensure that hospital wastes disposal is done in a fashion that prevents accidental infection. Incineration of all hospital waste is being done in large hospitals in India. In smaller hospitals it might be preferable to disinfect potentially infective material by chemicals and then disposing them in the same fashion as the uninfected materials. Bleaching powder solution in appropriate concentration is the readily available, reliable and economical method for disinfection of potentially infected hospital waste prior to disposal.

CONCLUSION

The single crucial characteristic of a well functioning family is that they care and take care of the needs for the welfare of all the members of the family. The family holds the key to the success of the HIV/AIDS control and prevention efforts especially in developing countries. The surest way of ensuring that the sexual transmission of HIV is minimised is to promote and protect the norm of mutually faithful monogamous relationship within the family. Parental example and peer pressure, reinforced by the AIDS awareness campaign might be the most effective method of preventing experimentation with casual sex and drugs during adolescence and adult life. Given the socio-economic scenario and the limitations of social security provisions in developing countries like India the family is likely to be the major safety net that provides for the care of HIV infected persons and AIDS patients and later for support of the disrupted family and the AIDS orphans. The family thus constitutes the best defense against spread of HIV infection and care provider for those already infected.

Families take care

All families, traditional or non-traditional, can help stop AIDS spreading by making sure that their members understand — and act on — the facts about HIV and safer behaviour. And if one of their members *does* fall ill with AIDS, families are often the best source of compassionate care and support. (World AIDS Day Newsletter 1994 - No.2)

Among Asians the family ties are very strong. HIV infection reached Asia a decade later; the epidemic was recognised and control measures were initiated in the silent phase of the epidemic. These might help the countries of this populous continent to limit both the adverse impact and the rapid spread of HIV infection. The challenge is to ensure speedy and effective implementation of the intervention measures through cooperation and involvement of families and other care providers in the society. The fate of mankind during the next millennium may rest on the successful implementation of the twin programmes of AIDS control and fertility regulation.

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This write-up is contributed by Dr. P.Ramachandran, Dy. Director-General (Sr.Grade), ICMR Headquarters, New Delhi.

ICMR NEWS

The following meetings of various technical groups/committees of the Council were held:

Task Force on Adverse Drug Reaction Monitoring	October 17, 1994 (at Bombay)
Annual Review Meeting of National Cancer Registry Programme	October 24, 1994 (at Madras)

Participation of ICMR Scientists in Scientific Events:

Dr. Kalyan Banerjee, Director, and Dr. B. Lalitha Rao, Dy. Director, National Institute of Virology, Pune, participated in the III Asia-Pacific Congress of Medical Virology at Beijing (October 23-28, 1994).

Dr. G.V.Satyavati, Director-General, ICMR, and Dr. S. Radhakrishna, Director, Institute for Research in Medical Statistics, Madras, participated in the IX WHO Meeting of Directors of Medical Research Councils or Analogous Bodies and Concerned Research Foci in the Relevant Ministries at Kandy (October 24-28, 1994).

Dr. Vinodini Reddy, Director, Dr. K. Vijayaraghavan, Dy. Director and Dr. Shahnaz Vazir, Research Officer, National Institute of Nutrition (NIN), Hyderabad, participated in the XVI International Vitamin A Consultative Group Meeting at Chiang Rai (October 24-28, 1994).

Dr. Kamala Krishnaswamy, Dy. Director (Senior Grade), NIN, Hyderabad, participated in the Joint

Expert Panel Meeting of American Institute for Cancer Research and World Cancer Research Fund at London (October 26-28, 1994).

Dr. J.J. Rodrigues, Director-in-Charge and Dr. A.R. Risbud, Asstt. Director, National AIDS Research Institute, Pune, participated in the VII NCVDG Meeting on Advances in AIDS Vaccine Development at Reston, Virginia (November 6-10, 1994).

Dr. V. Jagadeesan, Asstt. Director, NIN, Hyderabad, participated in the conference of the International Society for Free Radical Research at Sydney (November 6-10, 1994).

Dr. V.P. Sharma, Director, Malaria Research Centre (MRC), Delhi, participated in the International Symposium on Core Data Needs for Environmental Assessment and Sustainable Development Strategies at Bangkok (November 15-18, 1994).

Dr. N. Pralhad Rao, Dy. Director (Senior Grade), NIN, Hyderabad, participated in the International Meeting on Rural Household Food Security at Hanoi (November 15-19, 1994).

Dr. T. Adak, Asstt. Director and Dr. R.C. Dhiman, Sr. Research Officer, MRC, Delhi, visited Moscow for discussions on the bilateral programme on malarionogenic stratification and mathematical modelling for malaria under the Indo-Russian Agreement in the Field of Medical Sciences and Public Health (problem area-Malaria) (November 16-29, 1994).

ICMR AIDED SYMPOSIA/SEMINARS/WORKSHOPS/COURSES/CONFERENCES

Symposium/Seminar/Workshop/ Course/Conference	Date & Place	Contact Address
MICON-International'94.	November 9-12, 1994; (at Mysore)	Dr. R. Shankaran, Chairperson of the Organising Committee, MICON-International'94. Defence Food Research Laboratory, Siddhartha Nagar, Mysore.
International Symposium on Gerontology and VII Conference of the Association of Gerontology (India).	November 14-16, 1994; (at New Delhi)	Dr. A.B. Dey, Organising Secretary of the Symposium, Room No.3096, Department of Medicine, All India Institute of Medical Sciences, New Delhi.
Brain Storming Session on Molecular Immunology.	December 9-10, 1994; (at Bhubaneswar)	Dr. B. Ravindran, Asstt. Director, Regional Medical Research Centre, Bhubaneswar.
Seminar on Genetic Epidemiology and XX Annual Conference of Indian Society of Human Genetics.	December 11-13, 1994; (at Hyderabad)	Dr. J.S. Murty, Professor and Head, Department of Genetics, Osmania University, Hyderabad.
III International Conference on DNA Fingerprinting.	December 13-16, 1994; (at Hyderabad)	Dr. Lalji Singh, Organising Secretary of the Conference, Centre for Cellular and Molecular Biology, Hyderabad.
XIX Conference of the Electron Microscope Society of India.	December 14-16, 1994; (at New Delhi)	Dr. S.K. Sharma, General Secretary, Electron Microscope Society of India, c/o National Physical Laboratory, New Delhi.
International Symposium on Atherosclerosis, Thrombosis and Transfusion Medicine.	December 15-20, 1994; (at Bombay)	Dr. D. Mohanty, Director, Institute of Immunohaematology, Parel, Bombay.
National Workshop on Biostatistics and Biometry.	December 16-18, 1994; (at Varanasi)	Dr. Manju Pandey, Convenor of Workshop, Department of Zoology, Banaras Hindu University, Varanasi.
Guha Research Conference 1994.	December 28-31, 1994; (at Rameswaram)	Dr. D. Balasubramaniam, Convenor of the Conference, Centre for Cellular and Molecular Biology, Hyderabad.
Symposium on Chromosomal and Molecular Basis of Genetic Analysis.	January 13-15, 1995; (at Varanasi)	Dr. R. Raman, Convenor, Chromosomal Symposium, Department of Zoology, Banaras Hindu University, Varanasi.
National Symposium on Modern Trends in Animal Health and Production Research and its Impact on Rural Development.	January 24-25, 1995; (at Hisar)	Dr. S.K. Mahipal, Organising Secretary of the Symposium, Department of Veterinary Public Health and Epidemiology, C.C.S. Haryana Agricultural University, Hisar.
IV National Workshop on Mycoplasmaology.	January, 1995; (at Madras)	Dr. Usha Anand Rao, Organising Secretary of the Workshop, Department of Microbiology, Dr. A.L.M. Postgraduate Institute of Basic Medical Sciences, Madras.

COUNCIL'S TRAINING PROGRAMMES

Nutrition

At the National Institute of Nutrition, Hyderabad:

... Annual Training Course in Nutrition (December 1, 1994-February 28, 1995).

Occupational Health

At the National Institute of Occupational Health, Ahmedabad:

... Training Course in Pesticide Residue Analysis (December 5-9, 1994).

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