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Protection of the African Child against HIV Infection

AA Asindi+ E Archibong*

Summary

Asindi AA, Archibong E. Protection of the African Child against HIV Infection. *Nigerian Journal of Paediatrics 1997; 24: 1.* The problems of the African child with HIV infection potentials are quite unique because of the global increase in the incidence of HIV infection and the increased birth rate in the poverty-stricken parts of Africa with high mother-to-infant transmission rate of HIV infection. AIDS is still an incurable disease and very costly in controlling; therefore, health workers should direct their efforts towards prevention and health education. It is possible to adopt very basic and routine procedures to protect the African newborn from mother-to-child HIV contamination; these include the disinfection of the birth passage during labour, mandatory elective caesarean section on all infected mothers, the avoidance of episiotomy and invasive traumatic procedures across the placental barrier or on the foetus and heat sterilization of breast milk. It appears that the hope for chemoprophylaxis against AIDS in Africa in the nearest future is very slim in view of the current astronomical pricing mechanism. This pessimism regarding drugs should, hopefully, not apply to vaccines. Ethical principles of justice require that those who bear the risks of the trials, should have a commensurate share in the benefits of any effective vaccine. Africa has constituted a fertile ground for most HIV vaccine trials and therefore the people should be given first access to the vaccine. Manufacturers of the vaccines should indefinitely make the vaccine available free, or at least, at substantially reduced prices to the citizens of the host countries. Perhaps, there is wisdom in suggesting a pricing system in which the rich industrialised countries effectively subsidize the distribution of the vaccines in the developing nations.

College of Medical Sciences, University of Calabar

Department of Paediatrics

\+ Professor

Department of Obstetrics and Gynaecology

* Senior Lecturer

Correspondence: AA Asindi
P.O. Box 641, Abha, Saudi Arabia.

Introduction

IT had been estimated that almost one million African women with the human immunodeficiency virus (HIV) infection, would become pregnant in 1996 and 300,000 of their off-springs would vertically contract the infection. [1] Mother-to-child transmission

of HIV infection is said to be responsible for about 20 percent of all new infections in African countries.[1] Estimated rates of this mode of transmission tend to vary from place to place;[2,3] it is relatively lower in Europe (15 - 20 percent) and in the USA (15 - 25 percent) compared to Africa (25 - 35 percent).[4] This disparity in the rates of transmission is said to be influenced by a number of factors including the adult incidence rates in the group studied, breast feeding practices and the maternal viral burden which appears to be the most important. For some pregnant women with AIDS, the rate of foetal and perinatal infection may approach 70 percent.[5] Generally, well known measures towards the prevention of HIV spread in the population include the maintenance of safe sexual behaviour, use of condom and strategies providing transfusion of safe blood and blood products. This article seeks to review and highlight specific preventive measures that are available elsewhere against HIV infection in newborn infants and the main thrust of interest is on those measures that are feasible in the African context.

Mode of mother-to-child transmission

Although the chronology of most intrauterine HIV transmission is not certain, the virus appears to cross the placental barrier very early in pregnancy.[6] HIV has been demonstrated in products of pregnancy aborted at eight weeks of gestation,[6] but the intrauterine transmission maximises in the second trimester. The transmission process appears to be enhanced in women who are in the seroconversion phase of the disease and in those with P24 antigenemia and low CD4 T lymphocyte count of less than 0.6×10^9 /L. It is thought that the virus-infected maternal macrophages invade the foetal villous stroma, but the more plausible method is that the virus in the maternal system is released from decidual cells which are subsequently phagocytosed by syncitiotrophoblasts.[7]

There is at present, an overwhelming evidence that the main bulk of mother-to-child transmission of the HIV occurs during labour and delivery.[8] The evidence for this is based on the observation that infants of HIV-positive mothers show no increase in the frequency of congenital malformations compared to the general population; birthweights are no different and the exposed infants usually are symptom-free in the first weeks of life. In such infants, the HIV may be detected in only about 50 percent during the neonatal period and symptoms appear at above six months of age (mean age 12 months) in a majority. The risk of contamination during labour appears to be enhanced if there is a premature and prolonged rupture of the foetal membranes whereby the cervical and vaginal secretions which harbour a high concentration of HIV in affected mothers, ascend into the uterine cavity. Similarly, prolonged and obstructed labour increases the period of contact between the foetus and the infected birth canal, thus facilitating the transmission process. Transmission is also higher in children born of vaginal delivery with episiotomy as the infant is very likely to ingest, or inhale the infected blood derived from the wound. The risk of transmission of HIV from the breast milk in infected postpartum mothers has been estimated at 30 percent, but when the mother is infected prenatally, the additional risk of transmission through breast feeding over and above transmission *in utero*, or during delivery is 14 percent.[9] This risk appears to increase with the duration of breast feeding and preex-

isting inflammation of the oropharyngeal and gastrointestinal mucosae of the newborn. [10]

Protective measures

Preventive measures are available for protecting the foetus and the newborn of HIV-positive women against contamination, but some of these measures are only feasible depending on the level of health-care that is provided in the community. The viral load in the mother which is a strong determinant of mother-to-child transmission can be reduced antenatally by the use of antiretroviral drugs. Zidovudine, the current drug of choice for this measure, has been tried in the USA and France and found to be of some benefit. [11] Briefly, the mother receives the drug orally, at a dose of 100mg five times a day, starting from between week 14 and 34 of gestation and throughout pregnancy and additionally, an intravenous dose, 2mg/kg infused over one hour during labour, followed by 1mg/kg/hour until delivery. The newborn infant receives the syrup form of the drug, the dose being 2mg/kg, four times a day, starting from the age of eight to twelve hours for a period of six weeks. On this regimen, the risk of mother-to-child transmission was reduced by 68 percent.

The Centres for Disease Control (CDC) recommend the use of this regimen in HIV-positive pregnancies, although time is needed to determine long-term complications on both the mothers and infants. [12] Long-term administration of zidovudine in late pregnancy and labour appears to be safe and well tolerated by both mother and infant. [13] Because of its extremely high cost, this drug is not available in most African countries. However, the WHO is currently undertaking less expensive short-course zidovudine trials in several African countries in an effort to accommodate the African community in this chemoprophylaxis approach. Other practicable and less expensive preventive measures against antepartum transmission in Africa, include avoidance of amniocentesis, cordocentesis and placental biopsy. These are invasive procedures which can increase the chances of maternal blood leaking into the foetal circulation. During the intrapartum period, a simple preventive procedure such as early suctioning of the nasopharynx at birth, may drastically reduce HIV contamination of the infant's respiratory and alimentary tracts. Forceps delivery is preferred to vacuum extraction; foetal scalp electrodes for monitoring and scalp sampling of blood should be avoided as the skin trauma created by these procedures may provide a portal of entry for the virus. A thorough douching of the birth canal with antiviral agents constitutes an inexpensive means of protection. The commonly used disinfectants such as chlorhexidine gluconate and benzylkonium chloride solutions, appear to hold good promise as safe sterilizing agents. [14] There is a strong recommendation for a general and mandatory use of these compounds in all African women in labour, irrespective of their HIV status, especially where antenatal serologic test for HIV is not available. Elective caesarean section has been found to reduce the vertical transmission rate by 50 percent compared to vaginal delivery. [15] This mode of delivery is thought to eliminate exposure to cervical and vaginal fluids [3,16] and remove the risk of transmission by microtransfusion of the infected maternal blood during uterine contraction. [8]

While the CDC can confidently and safely advise HIV seropositive women in developed and

industrialised countries of Europe and USA to forego breast milk in place of artificial feed for fear of contagion, [17] this approach cannot be applied to poor African communities where the cost of formula feed is prohibitive and lack of adequate hygienic conditions in reconstituting the milk may easily lead to diarrhoea with dehydration and malnutrition. Where infectious diseases and malnutrition are the main causes of infant deaths and infant mortality rate is high, breast feeding should be the advice to be given to pregnant women, including those who are HIV-infected. Breast feeding therefore, has to be sustained in the African setting, but in high risk situations, it would be proper to advise that all HIV-positive mothers should avoid direct sucking but rather, the milk should first be expressed and boiled before feeding. This approach appears tedious and cumbersome and would eliminate the anti-infective properties of the breast milk, but a price has to be paid in order to avoid a disease as devastating as AIDS which invariably carries an irreversible consequence of death. It is being postulated that since the colostrum constituent of the breast milk carries the bulk of the virus, withholding breast feeding for the first three to five days could be of benefit. The advantage of this is yet to be substantiated; moreover, it is conversely argued that HIV-I specific IgM and IgA, leukocytes, lactoferrin and lysozymes, which are relatively abundant in the colostrum of infected mothers, may protect against the infectivity of HIV. [18,19]

Vaccination against HIV is potentially a critical element of any programme seeking to prevent AIDS epidemic. This is particularly true in developing countries where the high price of antiviral drugs would make chemoprophylaxis inaccessible to the vast majority of HIV-infected individuals. The use of hyperimmune intravenous immunoglobulin (HIVIG) is being practised in the USA on women who are receiving antiviral therapy. Vaccinations without antiviral medication are also currently being tried out in Thailand, Uganda, Zaire and other African countries. [20] Preliminary efficacy trials towards the provision of vaccines for both passive and active immunisation against HIV are already on course in Africa. Attempts are being made to develop vaccines in two broad categories namely: those that prevent acquisition of HIV (prophylactic vaccines) and those that delay or prevent the progression in those already infected (therapeutic vaccines). Although considerable progress in the development of both vaccines has been made, obstacles remain. For instance, it is extremely expensive and difficult to obtain the immunoglobulin, hence it is envisaged that the consumers in poor world countries cannot afford it in the long run. The WHO, UNICEF and other philanthropic NGOs have critical roles to play in this area by ensuring that free vaccines are available, as is the case with vaccines against EPI diseases, to pregnant women in developing countries. Due to strain variation, such vaccines must be appropriate to the HIV strains that occur in the developing countries. [21] This should therefore inform the decision to conduct vaccine trials locally on the population at risk and to monitor the occurrence of immediate adverse reactions or those that occur years after vaccine administration. Other protective approaches include the prevention, or termination of pregnancy in all HIV-seropositive women. This would involve frequent population screening of all females of child-bearing age. Every pregnant woman should be considered potentially HIV-positive. Unfortunately, a large-scale

screening carries a financial burden which is too heavy to be borne by most, if not all African nations. Also, interference with pregnancy appears to be ethically and culturally too drastic a step to be accepted by an African woman or her family.

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