ORIGINAL ARTICLE

Pediatric HIV in Kano, Nigeria

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Abstract

Background: Pediatric human immunodeficiency virus (HIV) infection is still an important public health issue despite a decrease in global, national, and local seroprevalence rates.
Design: A prospective, hospital-based study was conducted.
Materials and Methods: One-hundred and sixty children presenting for the first time to the hospital were studied. Each child had a detailed physical examination and initial double rapid HIV antibody tests. A virological confirmatory test was done for those aged less than 18 months of age with positive results. Mothers of HIV-infected children also had HIV testing. HIV-infected children were enrolled into HIV care and followed up for 6 months. Data were analyzed using the SPSS 16.0 for Windows.
Results: Twenty-two (13.8%) children were confirmed HIV-infected. The mean age was 26.9 ± 30.8 months. Male to female ratio was 1.1:1. Probable modes of transmission were mother-to-child in 63.6%, group circumcision in 22.7%, sexual transmission in 9.1% and unscreened blood transfusion in 4.5%. The most frequent symptoms on presentation were fever in 95.4% of patients, cough and weight loss in 77.3% and diarrhoea in 59.1%. The most common signs were hepatomegaly in 77.3%, pyrexia and crepitations in 72.7%, and pallor in 40.9%. Commonly diagnosed conditions were undernutrition, diarrheal disease, oral thrush, and pneumonia. Tuberculosis co-infection was diagnosed in 18.2% of children. Fourteen (63.6%) children had advanced and severe immunodeficiency. Mortality rate over 6 months was 18.2%.
Conclusion: Early diagnosis of pediatric HIV and prompt institution of treatment in children would go a long way in reducing the scourge of the disease.

Key words: Clinical features, human immunodefi ciency virus/acquired immunodeficiency syndrome, mortality, pediatrics, prevalence

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Introduction

Majority of children infected with the human immunodeficiency virus are living in sub-Saharan Africa.[1] While global figures are on the decline, the numbers of children living with and dying of the human immunodeficiency virus (HIV) infection are on the increase in Nigeria.[1,2] The number of children living with HIV in Nigeria increased from 220 000 in 2007 to 360 000 by the end of 2009.[2] There were 220 000 deaths due to HIV at the end of 2009,[1] an increase from 170 000 at the end of 2007.[2]

When infected with HIV, children present with a wide spectrum of clinical presentations ranging from asymptomatic HIV infection to acquired immunodeficiency syndrome (AIDS), characterized by severe immunosuppression. Predominant presentations include respiratory infections, malnutrition, diarrhea, and septicemia.[3-7]

This study was undertaken to determine the prevalence, clinical features and CD4+ counts plus percentage, and mortality rate of pediatric HIV infection in the region.

Materials and Methods

Consecutive children aged between 2 months and 15 years presenting for the first time to the pediatric out-patient

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clinic and emergency pediatric unit of the hospital between June and August 2010 were screened for enrolment. Inclusion criteria were children whose caregivers provided informed consent. Children with known HIV infection were excluded. Ethical approval was obtained from the Ethics committee of the hospital.

Each enrolled child had a complete physical examination and an initial double rapid HIV test in parallel using the Determine™ (by ABBOTT Japan Co., Ltd., LOT 80610U100) and Unigold™ (by Trinity Biotech Plc., LOT T078027) HIV test kits. Those who tested positive to both test kits had blood drawn for further tests including HIV DNA PCR, complete blood counts, CD4 percentages (preferred immunologic marker for monitoring HIV disease progression in children under 5 years[8]) and CD4 counts (for children 5 years and above). Partec CyFlow counter, serial number 050117117 was used for the estimation of the CD4 count and CD4% while applied biosystems model 9700 was used for HIV DNA PCR in children less than 18 months. Mothers of HIV-positive children were also screened for HIV infection. Children with HIV infection were placed on trimethoprim-sulfamethoxazole prophylaxis and enrolled into an on-going, comprehensive HIV/AIDS care, and treatment program at the special treatment clinic at the study center. Further tests were carried out on the children depending on the suspected clinical condition, and these tests included chest X-rays, serum chemistries as well as microbiological studies on blood, cerebrospinal fluid, and urine. Children who required admission were admitted and managed according to established standards of care, and on discharge, HIV-infected children were followed up at the special treatment clinic while the uninfected children were followed up at the pediatric out-patient clinic.

Data obtained were analyzed using the SPSS software version 16.0 for Windows. Means, median, and percentages were calculated where appropriate. Results were presented in tables and figures. Categorical variables were compared using either the Chi-square test or Fisher's exact test while continuous variables were analyzed using the Student's *t*-test or analysis of variance. Statistical significance level was set at $P < 0.05$.

Results

One-hundred and sixty children comprising 87 males and 73 females were enrolled into the study. The age and gender distribution of the subjects are shown in [Table 1]. The male:female ratio was 1.1:1. The mean age was 26.9 ± 30.8 months. Eighty-nine percent of the children were less than 5 years of age, with those less than 2 years comprising 60% of these. Twenty-two (13.8%) children were confirmed positive for HIV infection. Of those confirmed, 18 (81.8%) were less than 5 years of age while 12 (54.4%) were less than 2 years.

Mother-to-child transmission of HIV was the probable mode of transmission in 14 (63.6%) of the HIV-infected children, with non-vertical transmission accounting for 36.4%. The probable modes of transmission in the HIV-infected children included are shown in [Figure 1].

The clinical presentation of the subjects is presented in [Table 2]. Fever was found in 21 (95.4%) children, cough in 17 (77.3%), and weight loss in 17 (77.3%). The skin lesions seen in the HIV-infected children were seborrhoeic dermatitis and extensive tinea corporis. The neurological manifestations included delayed developmental milestones, microcephaly, convulsions, and coma. Two children (9.1%) had abdominal pain with foul-smelling vaginal discharge on presentation. Seventeen (77.3%) of the HIV-infected children had more than one symptom/sign at presentation.

[Table 3] shows the associated illnesses found in the HIV-infected subjects. Seventeen (77.3%) of the HIV-infected children had more than one co-morbid condition at presentation. Undernutrition and diarrheal disease were the commonest associated morbidities found in 17 (77.3%) and 15 (68.2%) children, respectively. Other

Table 1: Age and gender distribution of the subjects

Age group (months)	Male *n* (%)	Female *n* (%)	Total *n* (%)
2-<12	29 (18.1)	29 (18.1)	58 (36.2)
12-<24	20 (12.5)	18 (11.2)	38 (23.8)
24-<36	16 (10.0)	16 (10.0)	32 (20.0)
36-<48	6 (3.8)	3 (1.9)	9 (5.6)
48-<60	5 (3.1)	0 (0.0)	5 (3.1)
60-<120	8 (5.0)	3 (1.9)	11 (6.9)
120-180	3 (1.9)	4 (2.5)	7 (4.4)
Total	87 (54.4)	73 (45.6)	160 (100)

Table 2: Clinical features found in the HIV-infected subjects

Clinical feature	Number (%)
Fever	21 (95.4)
Cough	17 (77.3)
Weight loss	17 (77.3)
Hepatomegaly	17 (77.3)
Crepitations	16 (72.7)
Vomiting	14 (63.6)
Diarrhoea	13 (59.1)
Lethargy	12 (54.4)
Splenomegaly	9 (40.9)
Pallor	9 (40.9)
Neurological manifestations	8 (36.4)
Parotid fullness	8 (36.4)
Oral sores	7 (31.8)
Skin manifestations	6 (27.3)
Vaginal discharge	2 (9.1)

*Most children had more than one clinical feature on presentation, HIV=Human immunodeficiency virus

diagnoses in the HIV-infected children included pneumonia, septicemia, disseminated tuberculosis, and meningitis in 40.9, 31.8, 18.2, and 13.6%, respectively.

The mean CD4 counts and percentages of the HIV-infected children in different age groups are shown in [Table 4]. The mean CD4 percent for all children was 21.95 ± 7.4 while it was 20.55 ± 4.8 for children under 5 years of age. [Table 5] shows the comparison between the immunological parameters and the WHO clinical stage in the HIV-infected children. Fourteen (63.6%) children were in advanced and severe stages of immunodeficiency.

The mortality pattern in the study population after 6 months of follow up is shown in [Table 6]. Four (18.2%) of the 22 HIV-infected children died compared to 3 (2.2%) uninfected children and this was statistically significant ($P = 0.001$).

Table 3: Associated conditions in HIV-infected patients

Associated illness	Number (%)
Undernutrition	17 (77.3)
Diarrhoeal disease	15 (68.2)
Pneumonia	9 (40.9)
Septicemia	7 (31.8)
Disseminated tuberculosis	4 (18.2)
Meningitis	3 (13.6)
Chronic suppurative otitis media	2 (9.1)
Sexually transmitted infection	2 (9.1)
Malaria	1 (4.5)
Measles	1 (4.5)

*Most children had more than one associated illness, HIV=Human immunodeficiency virus

Table 4: Mean CD4 counts and CD4% of HIV-positive children in different age groups

Age range (months)	Number (%)	Mean CD4 count±SD	Mean CD4%±SD
0-<12	8 (36.4)	1465±777	22.1±7.9
12-<24	4 (18.2)	650±308	16.5±7.2
24-<36	3 (13.6)	885±264	22.7±4.2
36-<48	2 (9.1)	650±229	18.0±5.7
48-<60	1 (4.5)	1020	24.0
60-<120	2 (9.1)	584±404	24±11.3
120-<180	2 (9.1)	1547±104	32±1.4
Total	22 (100)	1071±626	21.95±7.4

HIV=Human immunodeficiency virus

Discussion

Most reported studies on pediatric HIV in Nigeria were either retrospective or done on children with clinical signs suggestive of HIV infection, thereby giving seroprevalence rates which differ widely.[3-7] However, a prospective study by Ogunbosi *et al.*[6] in 2008 in consecutive children presenting at the University College Hospital, Ibadan, showed a HIV prevalence rate of 10% which is only slightly lower than the 13.8% observed in this study. This study, though also hospital-based, reiterates the fact that HIV infection is still a significant public health issue in children and the figures indicate a need for more preventive efforts in combating the disease in this country.

The age distribution of pediatric HIV in this study did not differ much from what was obtained in previous studies

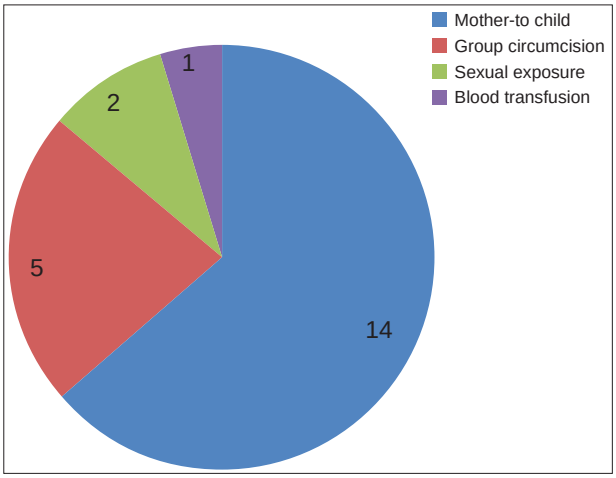

Figure 1: Pie chart depicting probable modes of HIV transmission in HIV-positive patients

Table 6: Mortality pattern in study population

Mortality status	HIV Status		Total	*P*	OR (95% CI)
	Positive	Negative			
Died	4 (18.2%)	3 (2.2%)	7	0.001	10.0 (2.07,48.34)
Survived	18 (81.8%)	135 (97.8%)	153		
Total	22	138	160		

CI=Confidence interval, OR=Odds ratio

Table 5: Comparison between immunological parameters and WHO clinical stage in HIV-infected children

Variables	*n* (%)	Mean CD4 count±SD	Mean CD4%±SD	WHO classification of immunodeficiency (%)			
				NS	Mild	Advanced	Severe
Clinical stage							
1	6 (27.3)	1491±470	31.0±2.2	3 (50)	2 (33.3)	1 (16.7)	0 (0.0)
2	3 (13.6)	1577±811	26.8±4.1	0 (0.0)	2 (66.7)	1 (33.3)	0 (0.0)
3	4 (18.2)	892±431	22.0±3.9	0 (0.0)	1 (25.0)	2 (50.0)	1 (25.0)
4	9 (40.9)	631±346	14.3±3.6	0 (0.0)	0 (0.0)	2 (22.2)	7 (77.8)

NS=Not significant immunodeficiency, HIV=Human immunodeficiency virus, WHO=World Health Organization

with younger children more commonly affected.[3-5,7] The finding may be explained by the more rapid progression of HIV disease in younger children.[9]

Vertical transmission is the commonest reported route of transmission of HIV in children worldwide. In this study, this route accounted for 63.6% of HIV infection in children which is much lower than the documented rates of over 90%.[1,2] Recent reports have emphasized the importance of non-vertical transmission of HIV especially in older children,[10-12] and this is corroborated by the findings in this study. However, the high prevalence of vertical transmission still emphasizes the need for strengthening of programs geared toward the prevention of mother-to-child transmission of HIV infection. In the developed world, efforts at preventing HIV infection in women of childbearing age and prevention of mother-to-child transmission have resulted in dramatic declines in the rates of HIV infection in children.[13,14]

Of note was the finding that, in this study, HIV transmission occurred probably *via* group circumcision in five infected boys (22.7%). Their mothers had tested negative to HIV and none of them had received blood transfusion previously. Three of the five boys had circumcision performed at the same time by a local barber, known as a "wanzami," while the other two boys had theirs done in other groups. Circumcision, being a religious obligation among Muslims, is a common practice in Northern Nigeria. However, the practice of carrying it out on groups of young boys, by a local barber, using one knife is a major public health problem as it increases the risk of transmission of other blood-borne diseases, as well as profuse bleeding which can be fatal. There is documented evidence for widespread unsterile procedures in African medical settings and non-vertical infections in African children[15] and the risks have been highlighted by several authors.[15,16] This calls for new initiatives to improve our health information system as well as to strengthen infection control in formal and informal health care settings.

Sexual transmission is believed to have accounted for 9.1% of modes of transmission of HIV in this study. This was found in girls who had reportedly been sexually abused and had presented with clinical symptoms and signs suggestive of sexually transmitted infections. Children in primary and secondary schools may experiment with sex and are at risk of sexual exploitation and molestation. Thus, in areas where there is early sexual debut, low rates of condom use and high HIV prevalence rates, as obtained in this study area, sexual abuse should be considered as a possible risk for HIV transmission.[17]

This study found a low rate of transfusion-related transmission of HIV of 4.5%. When compared to other studies, the results of this study may be a reflection of the improvement in our blood safety practices, as can be seen in countries where strict blood safety practices are enforced.[18,19] Blood transfusion as a possible mode of HIV transmission was found in a 60 month old, uncircumcised boy, who had blood transfusion in a private hospital on account of severe anaemia. Both parents had tested negative to HIV and the boy had never been transfused prior to the reported incident.

The clinical features which were suggestive of HIV infection were persistent diarrhea, chronic cough, prolonged fever, weight loss/poor weight gain, oral thrush, significant lymph node enlargement, hepatosplenomegaly, recurrent ear discharge, and parotid fullness. A previous report from this study area also documented similar findings.[20] This was in conformity with results from elsewhere,[3-5,21] and have been included in the World Health Organization major and minor clinical manifestation of pediatric HIV/AIDS in the African setting.[22] In this study, the features which were significantly predictive of HIV infection were persistent diarrhoea, weight loss/poor weight gain, recurrent ear discharge, and parotid fullness.

Neurologic manifestations were seen in as many as 22.7% of HIV-infected children in this study. The significance of neurologic manifestations of HIV infection in children has been highlighted by Tardieu *et al.*[23] in France where they found that the highest incidence of HIV-associated CNS disease occurs in the first 2 years of life in 30-60% of HIV-infected children, and this can occur independently of systemic HIV disease in 12% of cases. HIV readily invades the immature brain causing static or progressive encephalopathy. Majority of the children in this study were in this age group.

Protein-energy malnutrition is a common clinical syndrome associated with pediatric HIV, with marasmus being the most common form as reported in several studies.[5,24] In this study, 77.3% of HIV-infected children had evidence of undernutrition. Marasmus was seen in 45.5% of the subjects while 9.1% had kwashiorkor. The pattern of growth failure among the children in this study shows that there is a relatively high prevalence of acute (underweight of low weight-for-age) and chronic (stunting or low height-for-age) growth failure in HIV-infected. Targeted nutritional interventions in HIV-infected children may therefore have a significant impact in pediatric HIV care programs.

Respiratory tract infections are commonly found in HIV-infected children. In this study, 59.1% of HIV positive children had features of pneumonia on presentation. Of these, a diagnosis of bronchopneumonia was made in 40.9% and disseminated tuberculosis in 18.2%. This corroborates the findings in studies from other parts of the country,[3-5] with higher rates of tuberculosis co-infection documented in studies from India and Sudan.[9,25,26] However, reports from Africa have consistently shown that respiratory conditions are a major cause of morbidity and mortality among HIV-infected children.[3-5,9,27]

Children in this study, especially those under 5 years of age, had advanced disease as indicated by their clinical features, severe malnutrition, and profound immunosuppression on presentation. These children may have presented to other health facilities at different times and received treatment for various conditions without having been screened for HIV infection. This highlights the need for routine screening for HIV in our health facilities so as to prevent delayed diagnosis of HIV disease.

The mortality rate among HIV-infected children in this study was 18.2%. All the mortality was observed in children less than 24 months of age who were severely undernourished. This is similar to findings by other authors.[3,4] Undernutrition may be a direct consequence of the HIV infection, particularly from diarrhoea and anorexia resulting from the HIV disease. It may also be as a result of repeated infections, a function of the child's adverse environment, or a combination of all these factors leading to higher mortality. Therefore, strategies aimed at reducing infections in children such as routine immunization, improved socio-economic status, and improved nutrition should be strengthened and encouraged at all levels.

The burden of pediatric HIV/AIDS continues to impact negatively on our society. It is a major contributor to childhood morbidity and mortality, and early pediatric HIV diagnosis can reduce the poor outcomes in children. Prompt institution of therapy for HIV-infected children improves their outcomes. Health education, health promotion strategies, sustainable, and free availability of antiretroviral medications are ways through which adult HIV infection rates can be reduced, with the consequence of reduction in childhood HIV infection. Therefore, programs geared toward the prevention of mother-to-child transmission of HIV infection, which has been documented as the most common mode of HIV transmission, should be emphasized, and scaled up. There is the need to strengthen advocacy for the protection of children against harmful practices like group circumcision and sexual abuse which still occur in our society. Routine screening of blood before transfusion should continually be enforced especially in private settings. The Nigerian government and other stakeholders need to appreciate the need for drastic measures to be taken to combat pediatric HIV/AIDS.

References

1. Joint United Nations Programme on HIV/AIDS (UNAIDS). Report on the global HIV/AIDS epidemic 2010. Geneva: Switzerland; 2010.
2. Joint United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization. Report on the global HIV/AIDS epidemic 2008. July 2008. Geneva: Switzerland; 2008.
3. Oniyangi O, Awani B, Iregbu KC. The pattern of paediatric HIV/AIDS as seen at the National Hospital Abuja, Nigeria. Niger J Clin Pract 2006;9:153-8.
4. Onankpa B, Airede L, Ibitoye P, Idowu D. Pattern of paediatric HIV/AIDS: A five-year experience in a tertiary hospital. J Natl Med Assoc 2008;100:821-5.
5. Okechukwu AA, Gambo D, Okechukwu OI. The clinical features of paediatric HIV/AIDS at presentation at the University of Abuja Teaching Hospital, Gwagwalada. Niger J Med 2008;17:433-8.
6. Ogunbosi BO, Oladokun R, Brown BJ, Osinusi K. HIV infection in children presenting at the University College Hospital, Ibadan. Paper presented at the Paediatric Association of Nigeria Conference (PANCONF). Ibadan, Nigeria, Jan 2009.
7. Ejiofor OS, Onyire NB, Chapp-Jumbo AU, Ofomata JA, Akpati RN, Ezeokoli NO. The sero-prevalence of HIV antibodies in children attending Amaku General Hospital Awka, South-East Nigeria. Eur J Sci Res 2010;43:351-6.
8. Tindyebwa D, Kayita J, Musoke P, Eley B, Nduati R, Tumwesigye N, *et al.* editors. Handbook on Paediatric AIDS in Africa by the African Network for the Care of Children Affected by AIDS. 2nd ed. Chapter 2, HIV virology, pathogenesis and natural history, 2011.p. 22.
9. Spira R, Lepage P, Msellati P, Van De Perre P, Leroy V, Simonon A, *et al.* Natural history of human immunodeficiency virus type 1 infection in children: A five-year prospective study in Rwanda. Mother-to-child HIV-1 Transmission Study Group. Pediatrics 1999;104:e56.
10. Reid S. Non-vertical HIV transmission to children in sub-Saharan Africa. Int J STD AIDS 2009;20:820-7.
11. Vaz P, Pedro A, Le Bozec S, Macassa E, Salvador S, Biberfeld G, *et al.* Non-vertical, nonsexual transmission of human immunodeficiency virus in children. Pediatr Infect Dis J 2010;29:271-4.
12. Agu V. HIV infection in children aged 5-14 years. A summary report of an expert group meeting. Pretoria, South Africa: Human Sciences Research Council; 2008 Mar. 19p.
13. De Cock KM, Fowler MG, Mercier E, de Vincenzi I, Saba J, Hoff E, *et al.* Prevention of mother-to-child HIV transmission in resource-poor countries: Translating research into policy and practice. JAMA 2000;283:1175-81.
14. Mofenson LM. Pediatric HIV infection in developed and developing countries: Epidemiology and natural history. In: Shearer WT., Hanson C, editors. Medical Management of AIDS in Children. Philadelphia, PA: Saunders Co; 2003. p. 1-28.
15. Gisselquist D, Potterat JJ, Brody S. HIV transmission during paediatric health care in sub-Saharan Africa-risks and evidence. S Afr Med J 2004;94:109-16.
16. Reid S, Dawad S, Van Niekerk AA. Iatrogenic HIV transmission in South Africa: Evidence, estimates and moral perspectives. SA Fam Pract 2010;52:476-7.
17. Hanson IC, Lindegren ML, Hammett T, Fleming P. Sexual transmission of HIV infection in children (<13 years old) reported with AIDS, U.S.A. Int Conf AIDS 1994;10:258.
18. Lackritz EM, Satten GA, Aberle-Grasse J, Dodd RY, Raimondi VP, Janssen RS, *et al.* Estimated risk of transmission of the human immunodeficiency virus by screened blood in the United States. N Engl J Med 1995;333:1721-5.
19. Jones DS, Byers RH, Bush TJ, Oxtoby MJ, Rogers MF. Epidemiology of transfusion-associated acquired immunodeficiency syndrome in children in the United States, 1981 through 1989. Pediatrics 1992;89:123-7.
20. Hassan-Hanga F, Ibrahim M. Clinical indicators of HIV infection in under-five children with diarrhoea in a resource-limited setting. Sahel Med J 2009;12:13-8.
21. Shilpa R, Shah M, Tullu S. Clinical profile of pediatric HIV infection from India. Arch Med Res 2005;36:24-31.
22. WHO Global Programme on AIDS. Guidelines for the clinical management of HIV infection in children. Geneva: World Health Organization; 1993. p. 98. Report No.: WHO/GPA/IDS/HCS/93.3.
23. Tardieu M, Le Chenadec J, Persoz A, Meyer L, Blanche S, Mayaux MJ, *et al.* HIV-1-related encephalopathy in infants compared with children and adults. French paediatric HIV infection study group and the SEROCO group. Neurology 2000;54:1089-95.
24. Bakaki P, Kayita J, Moura M, Jorge E, Coulter J, Brian S, *et al.* Epidemiologic and clinical features of HIV-infected and HIV-uninfected Ugandan children younger than 18 months. J Acq Imm Def Syn 2001;28:35-42.
25. Shah I, Katira B. Seroprevalence of HIV infection in hospitalized paediatric patients at a tertiary care centre in western India. HIV Med 2007;8:265-6.
26. Hashim MS, Salih MA, El Hag AA, Karrar ZA, Osman EM, el-Sheikh FS, *et al.* AIDS and HIV infection in Sudanese children: A clinical and epidemiological study. AIDS Patient Care STDS 1997;11:331-7.
27. Lucas SB, Peacock CS, Hounnou A, Brattegaard K, Koffi K, Honde M, *et al.* Disease in children infected with HIV in Abidjan, Cote d'Ivoire. BMJ 1996;312:335.

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