

## HIV infection in pregnancy: Analysis of twenty cases

Kasioni Spiridoula<sup>1</sup>, Pappas Stefanos<sup>2</sup>, Vlachadis Nikolaos<sup>3</sup>, Valsamidi Irene<sup>1</sup>, Stournaras Stamatis<sup>1</sup>, Nousia Konstantina<sup>1</sup>, Farmakides George<sup>1</sup>

<sup>1</sup>6<sup>th</sup> Department of Obstetrics and Gynecology, Elena Venizelou hospital, Athens, Greece

<sup>2</sup>Hellenic Center of Disease Control and Prevention, Athens, Greece

<sup>3</sup>2<sup>nd</sup> Department of Obstetrics and Gynecology, National and Kapodistrian University of Athens, School of Medicine, Aretaieio hospital, Athens, Greece

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### Correspondence

Farmakides George

Elena Venizelou hospital, 2 Elena Venizelou Square, GR - 11521 Athens, Greece

**E - mail:** g.farmakides@hospital-elena.gr

### Abstract

**Introduction:** Prevention of mother - to - child transmission of HIV is at the forefront of global HIV prevention activities. Administration of antiretroviral drugs to mothers and neonates, scheduled caesarian section and prohibition of breastfeeding considerably have been indicated to decrease HIV transmission to the offspring.

**Material and Methods:** We retrospectively analyzed 20 cases of HIV positive pregnant women who received antenatal care and gave birth at our department during 2010 - 2013.

**Results:** Nineteen women delivered with elective caesarean section and received antiretroviral therapy during pregnancy and delivery, whereas one woman had a twin pregnancy with no antenatal follow - up and had

a vaginal acute labour. All infants were administered zidovudine for four weeks after birth and were not breastfed by their mothers. Among the 21 infants, 4 were preterm (<37 weeks gestation) and 4 had a low birth - weight (<2,500gr) (19%). All infants were negative for HIV after a 6 months follow - up.

**Conclusion:** Our results confirm that the recommended interventions are effective in controlling the HIV transmission to newborns and that early identification and treatment of all HIV - positive pregnant women can protect the next generation.

**Keywords:** HIV; pregnancy; perinatal HIV infection; prophylactic treatment of HIV

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**H**uman immunodeficiency virus (HIV) can be transmitted from mother to child, not only intrauterine, but also during labor or breastfeeding. It is estimated that in 2012, 260,000 infants worldwide contracted HIV perinatally from their mothers worldwide, most of them infected during labor. The latter value was 35% down compared with 2009, as a result of the expansion of antiretroviral prevention services. Antiretroviral therapy has been shown to

be of great importance. As of the end of December 2012, over 900,000 pregnant women with HIV globally received antiretroviral treatment<sup>1</sup>.

The most important predictor of vertical transmission is the HIV viral load of the mother, while other factors that can increase the risk of mother - to - child transmission are method of delivery, breastfeeding and gestational age<sup>2-5</sup>. There is strong evidence that early initiation of preventive

chemotherapy in pregnancy together with elective caesarean section to reduce the time of infant's exposure to mother's fluids after rupture of membranes, and by prohibiting breastfeeding, the infection rate decreases to less than 1%<sup>6</sup>.

The aim of this study was to describe the characteristics of pregnant women, who delivered in our unit, with HIV and their offsprings, as well as to present the results of the prevention therapy.

### Materials and Methods

Study subjects included 20 pregnant women diagnosed with HIV and their neonates. All 20 women were referred to the 6th department of obstetrics and gynecology of the general maternity district hospital "Elena Venizelou" during the period from January 1st, 2010 to February 28th, 2014, in cooperation with the Hellenic Center of Disease Control and Prevention. The medical files of these patients were retrospectively examined and we investigated the type of medicines used in antiretroviral therapy, the prenatal care, the presence of other infections, and the demographic data. Infant's birth weight and Apgar score at 1 and 5 minutes were also registered.

Quantitative polymerase chain reaction was used to estimate the number of maternal HIV RNA copies (viral load) at 36 weeks of gestation and in infants at 48 hours, and 2 and 6 months postpartum. All infected women provided informed consent to participate and the study was approved by the institutional ethical committee.

### Results

During the study period, 20 HIV infected pregnant women gave birth to a total of 21 neonates. The characteristics of the mothers are presented in Table 1. All pregnancies were achieved with natural conception. The age of the mothers ranged from 19 to 41 years (mean age:  $29.8 \pm 5.0$  years). 11 of the 20 women (55%) belonged to the 30 - 34 years age group and only 2 of them (10%) were older than 35 years. 16 women were primiparous

(80%). 19 pregnancies were single (95%) and there was only one twin pregnancy (5%). Twelve women (60%) were of Greek citizenship, while eight women (40%) were migrants, mostly from sub-Saharan African countries. The majority of women, 16/20 or 80%, were not married, only 4 of them were married. Six of the HIV-positive women were intravenous drug users (30%). Five HIV-positive women had a hepatitis C co-infection, one of them had a genital human papilloma virus (HPV) co-infection (5%), one had a genital herpes simplex virus (HSV) co-infection (5%). Furthermore, one woman had a history of Grave's disease, whereas the remaining women had no medical history of other disease or medication. 19 women (95%) were treated with antiretroviral medications during pregnancy and delivery, whereas one woman did not receive any antiretroviral therapy antenatally and was treated only during labor with zidovudine. 12 (60%) were treated with tenofovir/emtricitabine and lopinavir/ritonavir, and 7 (35%) with lopinavir/ritonavir and lamivudine/zidovudine. Intravenous zidovudine was infused for the duration of the labor and the caesarean section to all patients. All 19 women who were followed prenatally had a viral load of less than 50 HIV RNA copies/ml at 36 weeks of gestation and were delivered with scheduled elective caesarean section from 36 to 38 weeks and 2 days of gestation. One woman (5%) presented with preterm premature rupture of membranes (PPROM) and had a vaginal delivery of twins with an acute labor at 38 weeks and 3 days of gestation. The mean gestational age at delivery was 37 weeks and  $3 \pm 0.9$  days and the proportion of preterm births (<37 weeks gestation) was 19% overall (4 out of 21 neonates). Overall, birth-weight ranged from 2,050gr to 3,400gr (mean:  $2,782\text{gr} \pm 336\text{gr}$ ) whereas 19% of neonates (4 out of 21) were born with low birth-weight (<2,500gr). Among single pregnancies, there was only one low birth-weight neonate (1/19 or 5%). All infants had an Apgar score of 9 and 10 at the 1st and the 5th minute postpartum. All infants re-

**Table 1.** Characteristics of the HIV infected mothers and their neonates

Mother	Maternal age at delivery (years)	Gestational age at delivery	Birth weight (gr)	Sex	Nationality	Maternal marital status
1	34	37w 3d	2,820	Male	Non - Greek	Unmarried
2	33	37w	3,400	Male	Greek	Married
3	28	35w 6d	2,720	Female	Greek	Unmarried
4	33	38w	2,560	Male	Non - Greek	Unmarried
5	22	38w	2,810	Male	Greek	Unmarried
6	32	36w	2,400	Male	Non - Greek	Unmarried
7	30	38w	2,680	Male	Greek	Unmarried
8	30	38w	3,015	Male	Greek	Unmarried
9	30	38w	3,200	Male	Non - Greek	Married
10	24	35w 5d	3,200	Female	Greek	Unmarried
11	35	38w 1d	2,990	Male	Greek	Unmarried
12	25	38w 3d	2,320 2,220	Male Male	Non - Greek	Unmarried
13	28	35w 5d	2,780	Male	Non - Greek	Married
14	33	37w 3d	2,810	Female	Non - Greek	Unmarried
15	19	37w	2,050	Female	Non - Greek	Unmarried
16	25	37w	2,890	Male	Greek	Unmarried
17	41	38w 2d	2,990	Female	Greek	Unmarried
18	32	37w 2d	2,780	Female	Greek	Unmarried
19	32	38w2d	2,720	Male	Greek	Married
20	30	38w	3,080	Male	Greek	Unmarried

ceived a monotherapy with zidovudine within one hour after their delivery, and continued the chemoprophylaxis for four weeks. 15 neonates were males (71%) and 6 were females (29%) with a sex ratio of 2.5. None of the women breast - fed. All infants were HIV negative within 48 hours, and at 2 and 6 months post-partum, respectively.

### Discussion

This study demonstrated the sufficiency of HIV transmission prevention from HIV - positive mothers to their offsprings through antiretroviral therapy, by performing elective caesarean section and discouraging breast feeding. Antiretroviral prophylactic

treatment results in a marked decrease in the perinatal transmission of the infection, compared with a rate of up to 25% without treatment<sup>7</sup>. HIV testing and preventive interventions have resulted in more than 90% decline in the number of children perinatally infected with HIV in the United States. During 2000 - 2006, the number of women with HIV giving birth in the United States increased 30% to 8,700, however, the estimated annual number of perinatal HIV infections continued to decline and in 2010 only 162 children were vertically infected. The observed decreases resulted primarily from increased identification of infected mothers and timely prevention intervention<sup>6,8</sup>.

In Greece, HIV infection is a major health problem. According to the Hellenic Center of Disease Control and Prevention (<http://www.keelpno.gr>), the incidence of HIV in Greece dramatically increased, almost tripled, from 3.7 cases per 100,000 in 2002 to a historic high of 10.2 cases per 100,000 in 2012, whereas it substantially decreased (-28%) to 7.3 cases per 100,000 in 2013. Until the end of 2013, totally, 86 cases of HIV infection in children (aged <13 years old at the date of report) had been reported in Greece and 73% of them were infected by their mothers. 25 pregnancies occurred in HIV positive women in 2013. The appropriate prenatal care and awareness resulted in zero cases of HIV mother-to-child transmission in Greece during the past two years, 2012 and 2013.

“Elena Venizelou” maternity hospital in coordination with the Hellenic center of disease control and prevention is a specialized unit for prenatal care of HIV in pregnancy. In our unit, 20 women diagnosed with HIV infection were followed antenatally. The majority belonged to vulnerable social groups being unmarried mothers and 40% of them were migrants. 30% of them were also infected by hepatitis C due to intravenous drug use. Our population had a high proportion of preterm birth and low birth-weight (19%). These results are probably associated with both the poor socioeconomic status and the antiretroviral drugs. In a large European study, a higher risk of preterm birth was observed in the group of women who received antiretroviral treatment during pregnancy than the group that did not<sup>9</sup>.

Official guidelines from several scientific societies around the world recommend that HIV testing must be performed to all women immediately after the diagnosis of pregnancy. According to the revised World Health Organization (WHO) treatment criteria, antiretroviral treatment is required at stage 3 or 4 of the disease or a CD4+ lymphocyte count of <350 cells per  $\mu\text{L}$ . Furthermore, antiretroviral therapy should begin at 28 weeks of pregnancy or as soon as feasible thereafter for all

infected pregnant women<sup>10-13</sup>. Treatment with antiretroviral drugs has been proved a safe and effective means of succeeding maternal virologic suppression and decreasing infant mortality as well as mother to child transmission<sup>14</sup>. Moreover, there is evidence that delivery by elective caesarean section is associated with lower rate of HIV perinatal transmission, albeit the postpartum morbidity after caesarean section delivery is higher than that with vaginal delivery<sup>15,16</sup>. In contrast, the risk of perinatal HIV transmission has been found to rise by 2% with every 1 - hour increase in the duration of membrane rupture before delivery in HIV infected women with membrane rupture regardless of whether mothers receive antiretroviral therapy<sup>17</sup>. World Health Organization’s guidelines suggest that an elective caesarean section should be performed to women on antiretroviral therapy who have HIV load above 1,000 copies/ml near delivery, whereas vaginal delivery is an accepted alternative for those with a viral load below 1,000 copies/ml<sup>12</sup>. A national surveillance study in the United Kingdom and Ireland confirmed that mother’s HIV viral load is the most important risk factor for transmission - mothers with undetectable viral load (<50 copies/ml) had the lowest mother to child transmission rate of 0.1%), with no significant statistical difference reported between elective caesarean and planned vaginal delivery<sup>18</sup>.

In conclusion, pertinent care of pregnant women infected with HIV resulted in a zero rate of mother to child transmission in our unit, which is a remarkable achievement. Since HIV transmission in utero and during delivery account for almost the entire burden of HIV infections among children, a public health approach should focus on implementation of recommendations for universal prenatal HIV testing and adequate prenatal care for women diagnosed with HIV for further reduction of the ongoing perinatal transmission<sup>19,20</sup>. ■

#### Conflict of interest

All authors declare no conflict of interest.

## References

1. United Nations report on the global AIDS epidemic. 2013.
2. Mofenson LM. Interaction between timing of perinatal human immunodeficiency virus infection and the design of preventive and therapeutic interventions. *Acta Paediatr Suppl* 1997;421:1 - 9.
3. Dickover RE, Garratty EM, Herman SA, et al. Identification of levels of maternal HIV-1 RNA associated with risk of perinatal transmission. Effect of maternal zidovudine treatment on viral load. *JAMA* 1996;275:599 - 605.
4. Mofenson LM, Lambert JS, Stiehm ER, et al. Risk factors for perinatal transmission of human immunodeficiency virus type 1 in women treated with zidovudine. Pediatric AIDS Clinical Trials Group Study 185 Team. *N Engl J Med* 1999;341:385 - 93.
5. Nduati R, John G, Mbori-Ngacha D, et al. Effect of breastfeeding and formula feeding on transmission of HIV-1: a randomized clinical trial. *JAMA* 2000;3:1167 - 74.
6. Center for Disease Control and Prevention. HIV among pregnant women, infants, and children. <http://www.cdc.gov/hiv/risk/gender/pregnantwomen/facts/> (Accessed September 5, 2014).
7. Connor EM, Sperling RS, Gelber R, et al. Reduction of maternal-infant transmission of human immunodeficiency virus type 1 with zidovudine treatment. Pediatric AIDS Clinical Trials Group Protocol 076 Study Group. *N Engl J Med* 1994;331:1173 - 80.
8. Centers for Disease Control and Prevention (CDC). Achievements in public health. Reduction in perinatal transmission of HIV infection-United States, 1985-2005. *MMWR Morb Mortal Wkly Rep* 2006;55:592 - 7.
9. Thorne C, Patel D, Newell ML. Increased risk of adverse pregnancy outcomes in HIV-infected women treated with highly active antiretroviral therapy in Europe. *AIDS* 2004;18:2337 - 9.
10. British HIV Association guidelines for the management of HIV infection in pregnant women 2012. *HIV Med* 2012;13(Suppl 2):87 - 157.
11. The American College of Obstetricians and Gynecologists. Reducing HIV/AIDS infection in babies and improving the health of pregnant women with HIV/AIDS. <http://www.acog.org/~media/Department%20Publications/hivToolkit.pdf?dm-c=1&ts=20140920T1711227458> (Accessed September, 9, 2014).
12. PMTCT Strategic Vision 2010–2015. Preventing mother-to-child transmission of HIV to reach the UNGASS and Millennium Development goals: moving towards the elimination of paediatric HIV. Geneva: World Health Organization, 2010.
13. World Health Organization. Antiretroviral drugs for treating pregnant women and preventing HIV infection in infants. Recommendations for a public health approach (2006 revision).
14. Sturt AS, Dokubo EK, Sint TT. Antiretroviral therapy (ART) for treating HIV infection in ART-eligible pregnant women. *Cochrane Database Syst Rev* 2010:CD008440
15. Limpongsanurak S. Efficacy and safety of caesarean delivery for prevention of mother-to-child transmission of HIV-1. The WHO Reproductive Health Library; Geneva: World Health Organization.
16. Read JS, Newell MK. Efficacy and safety of cesarean delivery for prevention of mother-to-child transmission of HIV-1. *Cochrane Database Syst Rev* 2005: CD005479.
17. The International Perinatal HIV Group. Duration of ruptured membranes and vertical transmission of HIV-1: a meta-analysis from 15 prospective cohort studies. *AIDS* 2001;15:357 - 68.
18. Townsend CL, Cortina-Borja M, Peckham CS, de Ruitter A, Lyall H, Tookey PA. Low rates of mother-to-child transmission of HIV following effective pregnancy interventions in the United Kingdom and Ireland, 2000-2006. *AIDS*. 2008;22:973 - 81.
19. Mofenson LM. Protecting the next generation -- eliminating perinatal HIV-1 infection. *N Engl J Med* 2010;362:2316 - 8.
20. Park JW, Yang TW, Kim YK, Choi BM, Kim HJ, Park DW. Ten years of experience in the prevention of mother-to-child human immunodeficiency virus transmission in a university teaching hospital. *Korean J Pediatr* 2014;57:117 - 24.