



Research Article

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Investigating the Impacts of Medicinal Prevention with Antiretroviral Drugs in Pregnant Mothers with HIV on HIV Transmission to Infants in Khuzestan Province

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ABSTRACT

Now one of the problems related to health care in the world is viral HIV-1 infection. One of the major groups that are at risk is women in childbearing age who if become pregnant, they can transfer HIV virus during pregnancy, during delivery or while breastfeeding to the fetus. In this context one of the ways to reduce transmission of the virus to the fetus and the newborn is the use of antiretroviral drugs by pregnant women. So considering the lack of investigation the amount of impact of such treatments in Khuzestan province, the impact of prophylaxis by antiretroviral drugs to prevent mother-to-child HIV transmission were investigated in this study. 39 HIV-positive patients who were all from Khuzestan province were evaluated in this study. Information on HIV-positive pregnant mothers along with the newborns' cases of this group under the care of behavioral diseases counseling center in Ahvaz were collected. Mothers who have already been treated, their treatment was continued and otherwise prescribed three drugs of zidovudine, lamivudine and efavirenz began from week 12, and Elisa took place immediately after birth, at the age of 4 months and 9 months for newborns born from mothers with HIV infection. The results were analyzed using SPSS software. The mean age of the subjects was 28.33 ± 5.9 years old with range of 17-44. The mean age of patients who were positive for HIV transmission was 26.7 ± 4.81 years old, and in patients who had a negative transmission was 32 ± 5.37 years old. In total, 29 newborns (74.3%) were born without HIV, and 10 newborns (25.7%) were also positive for HIV transmission. 71% of the 39 mothers had cesarean delivery and 29% had also vaginal delivery. In terms of newborns' nutrition, 91.9% had powdered milk nutrition and 8.1 percent had also powdered milk nutrition. In terms of treatment of group in which mother and newborn were both treated contains 64.1% and in the second group the mother or the newborn was treated which consisted 25.6% cases, and the third group neither mother nor newborn were treated which contains 40.2%. Generally, HIV transmission from mother to newborn had a significant relationship with delivery type, nutrition type and receiving treatment. Regarding to the positive correlation between HIV transmission and delivery type, nutrition type and receiving treatment can be concluded that the use of antiretroviral drugs in pregnant mothers with HIV, choosing cesarean instead of vaginal delivery and also replace breast milk with powdered milk can be effective to reduce HIV transmission to newborns. However, further examinations implementation in this area with more samples is necessary in order to achieve more reliable results.

Keywords: Antiretroviral drugs, Pregnant mother, Newborn, HIV

INTRODUCTION

Viral HIV-1 infection has been remained as a problem in the health care world. According to global statistics in 2009 about 370 thousand children were ill with this disease (1). This virus can infect both genders at different ages, if they have risk factors. One of these classes is women in childbearing age and can constitute a large group and acquire the virus in many ways. In addition, if she becomes pregnant, she can also transfer the virus to the fetus during pregnancy, during delivery or while breast-feeding pass. In cases related to pregnancy, 35% of transmission occurs during pregnancy and 65 percent on-time delivery (2). Transmission from mother to child which is also called vertical transmission is the third common way of HIV transmission in the world (3). If untreated, the risk of transmission before or during birth is around 20 percent and 35 percent in those who do breastfeeding (4). Mother-to-child transmission of infection is estimated the reason of at least 90 percent of new infection of children (4). One of the ways to prevent transmission of the virus is to prescribe antiviral drugs during pregnancy along with avoiding breastfeeding and doing cesarean that can reduce the transmission of infection to less than 2% (5). A single dose injection of antiviral drugs during pregnancy and infancy significantly reduces the chance of disease transmission from mother to child (1). Researches on treatment with the antiretroviral drugs in recent years have brought promising results. For example, a study conducted in Brazil during 2003 and 2007 on 262 women with HIV + with a mean age of 27 years old, only 10 women (3.8%) transmitted HIV to their newborns, and use of anti-retroviral drugs had been also along with the increase of transmission (2). In addition, in India during 2010 to 2011, evaluation the impact of antiretroviral therapy (ART) and prevention treatment (PT) on viral load of female patients and its impact on transmission to newborn showed that only two of the children infected with HIV which were in the group of mothers under prophylaxis treatment (PT) (6). With the increase in life expectancy in people with HIV infection due to use antiretroviral drugs, and prevention of opportunistic infections with use of chemoprophylaxis and vaccination as well as providing consulting and education services in various fields of behavioral diseases counseling centers, the number of women infected with the virus that tends to pregnancy is on the rise. There are several ways to reduce transmission of the virus to the fetus and newborn, one of the most important of which is the use of antiretroviral drugs by pregnant mothers which is took place through reducing the viral load in blood and mother's genital secretions (7). High concentration of the virus is known as a risk factor for HIV-1 transmission from mothers who have not received zidovudine. Reduced transmission of the virus after treatment with zidovudine is partly due to the reduction in plasma viral RNA level. Regardless of the RNAHIV level or amount of CD4 + of plasma, primary maternal treatment with zidovudine is recommended to prevent transmission of the virus (8).

The single dose of nevirapine is considered the base of therapeutic regime in order to prevent HIV transmission before birth which is used either alone or in combination with other therapeutic regimes. In addition to the inhibitory impact of drugs before birth, nevirapine can also be used as a therapeutic regime after birth (9). Considering the useful impact of antiretroviral drugs to reduce transmission of HIV from mother to newborn, it is also took place in our country based on the guidelines of the country guide of prescribed drug. Some consulting and treatment services are also provided to patients based on country guidelines in Khuzestan province in south west of Iran. Despite the fact that in recent years for the prevention of HIV infection transmission from mother to fetus, prophylaxis with antiretroviral drugs have been given to pregnant mothers infected with HIV in these centers, but no study has been done in Khuzestan province to investigate the impact of such treatments. Knowing the issue how effective had been the current drug regimen and the actions that have already been done, is important to resolve the weaknesses and/or the use of more effective regimens. The present study was aimed to investigate the impact of prophylaxis with antiretroviral drugs be conducted in order to prevent mother-to-child HIV transmission using information gathered from cases of pregnant mothers with HIV infection and having the cases of children born in Khuzestan behavioral diseases counseling center.

MATERIALS AND METHODS

This study was retrospective and information has been collected based on the total cases available since 2009. 39 HIV-positive patients who were all from Khuzestan province were evaluated in this research. Information related to these patients was collected from behavioral diseases counseling center in Ahvaz. In this field, cases of pregnant HIV-positive mothers who referred to these centers for pregnancy period care along with the cases of newborns who born from this under care group were examined, and necessary information were used, including disease diagnosis, gestational age when visiting, use or non-use of antiretroviral drugs before pregnancy, the amount of CD4 count during pregnancy period, the start of treatment, ELISA test results in newborn baby, and other necessary information. Mothers who had already been treated, their treatment were continued and otherwise prescription of three drugs of zidovudine, lamivudine and efavirenz began from the 12th week. According to the country guidelines for the care of pregnant mothers with HIV, Elisa test was took place immediately after birth, at the age of 4 months and 9 months for newborn born from mother with HIV infection. Suckling safety criteria, negative test result was after the age of 9 months, and ELISA test results were reported in the age of 24-18 months in order to ensure the

health of suckling. Also, if the test was positive at age of 9 months, the suckling was considered infected. The results were also analyzed using SPSS software. Chi-square test was used in order to examine the relationship between qualitative variables.

RESULTS

In total 29 newborns (74.3%) were born without HIV, and 10 newborns (25.7%) were also positive in terms of HIV transmission. Among the 39 newborns, 27 persons (69.2%) were male and 12 persons (30.8%) were female. In this sense, no significant difference was observed between gender and HIV transmission ($P= 0.06$) (Table 1). The mean age of the subjects was 28.33 ± 5.9 years old in the range of 17-44. 10 persons (6.25%) was under 25 years old, 25 persons (1.64%) ranged from 25-35 years old, and 6 persons were (2.10%) over 35 years old. The mean age of patients who were positive in terms of HIV transmission was 26.7 ± 4.81 years old and in patients who had a negative transmission was 32 ± 5.37 years old. Transmission of virus based on the age of patients was not significant ($P= 0.88$) (Table 1). In terms of CD4 in mothers, 13 persons (35.1%) were less than 350, 9 persons (3.24%) were between 350 to 500, and 15 persons (40.5%) were more than 500. 2 persons had uncertain condition in this term. No significant relationship was found between the number of CD4 and virus transmission ($P= 0.77$).

27 out of 39 mothers (71%) have a cesarean delivery and 11 persons (29%) had also a vaginal delivery. A case had also uncertain condition. There was a significant relationship between delivery type and HIV transmission ($P= 0.00$) (Table 1). Newborns were classified in three weight categories that 3 newborns (8.6%) had weight less than 2500 g, 27 newborns (77.1%) between 3500 and 2500 g, 5 newborns (14.3%) over 3500 g, and the condition of 4 of cases were unknown. No significant difference was observed between the newborns' weight and HIV transmission ($P= 0.21$). In terms of newborns' nutrition, 34 newborns (91.9%) had powdered milk nutrition, and 3 newborns (8.1%) had also powdered milk nutrition, and two others had also uncertain condition. A significant relationship was observed between the amount of HIV transmission and nutrition type, ($P= 0.01$) (Table 1). In terms of treatment, patients were divided into 3 groups: group where both mother and newborn received treatment, including 25 cases (64.1%) Bond. The second group the mother or the newborn received treatment that constituted 10 (25.6%) cases, and in the third group, neither mother nor newborn receive any treatment, including 4 persons (10.2 percent). A significant correlation was seen between the transmission of HIV virus and treatment at the level of 5% ($P= 0.03$) (Table 1).

Table 1. HIV transmission based on the studied characteristics

Variable	Sub-Group	Transmission of HIV (percentage)		Total frequency (percentage)	Significance level
		positive	negative		
Age of mother	Under 25	(80)8	20(2)	(25.6)10	0.88
	25-23	(78)18	(28)7	(64.1)25	
	Over 35	(75)3	(25)1	(10.2)4	
Baby gender	Male	(63)17	(37)10	(69.2)27	0.06
	Female	(91.7)11	(8.3)1	(30.8)12	
Number of CD	Below 350	(77)10	(23)3	(35.1)13	0.77
	350-500	(77.8)7	(22.2)2	(24.3)9	
	Over 500	(66.7)10	(33.3)5	(40.5)15	
Delivery type	Cesarean	(92.6)25	(7.4)2	(71)27	0.00
	Vaginal	(26.4)4	(63.6)7	(29) 11	
Birth weight	Below 2500	(100)3	(0)0	(8.6)3	0.21
	2500-3500	(70.4)19	(29.6)8	(77.1)27	
	Over 3500	(100)5	(0)0	(14.3)5	
Nutrition type	Powdered milk	(0)0	(100)3	(91.9)34	0.01
	Breast milk	(83.8)28	(16.2)6	(8.1)3	
Receive treatment	Both	(88)22	(12)3	(64.1)25	0.03
	One	(50)5	(50)5	(25.6)10	
	None	(50)2	(50)2	(10.2)4	

DISCUSSION

Results of this study showed that the HIV virus transmission can be affected by means of changes applied in nutrition type and delivery method as well as using antiretroviral drugs such as zidovudine, lamivudine and efavirenz in ways that prescription of the drug to the mother and the newborn as well as using powdered milk and cesarean can lead to a decrease HIV transmission rate to the next generation. Other researches' investigation in this field also confirms that the use of expressed methods has a significant impact on reduction or prevention of patient newborns' birth. For example, a study by Ahir and colleagues (6) conducted in India between 2010 and 2011, the evaluation the impacts of antiretroviral therapy (ART) and Prevention treatment (PT) on viral load of female patients and its impact on transmission to the baby was took place that the group treated with antiretroviral of was

receiving combinatorial regimen of three drugs lamivudine + astodin + nevirapine, and mothers prophylaxis group was receiving single-dose nevirapine during delivery.

About 60 percent of mothers undergoing the treatment with (ART), and another percentage undergoing the treatment with Prophylaxis (PT) that in comparison of these two groups, the number of CD4 cells in patients treated with (ART) significantly higher than the group of prophylaxis (PT). At the end of the study and follow-up, only two children infected with HIV who were in the group of mothers under prophylaxis (PT) (6).

In another study by Heather *et al.* (10) in terms of prospective in Ukraine between 2008-2010 was conducted on 3535 HIV + pregnant mothers, the use of antiretroviral therapy had been increased significantly in 2010 compared to 2008 (22% vs. 61%).

Among 2854 suckling 4.1 percent was infected to HIV, the prevalence was 1.3% in those who had received anti-retroviral combinatorial treatment, 3.8% prevalence in those who had received only zidovudine, and 18.6% prevalence in those who had received only nevirapine, and 22.9% prevalence in those who had not received any drugs. In total 42% (49.116) the cases of transmission to newborns were in those who had not received any drugs before birth.

Among the 1421 mothers who had received antiretroviral therapy before delivery, each unit increase in logarithm based on 10 in viral load had been associated with a 78 percent increase in transmission risk (10). Also, another research was carried out by John von Park and colleagues (11) in Korea between 2003 and 2013 in terms of a retrospective, 8 out of 9 pregnant mothers had babies born with HIV+, all suckling received antiretroviral drug and any none of them received breast milk and all were also born through cesarean. The results of PCR and HIVAb in suckling were all negative in the first 24 hours of birth, in the first, second, third, sixth and 7-12th month (11).

In the Maria *et al* that have been conducted during 2003 to 2007 in Brazil on 262 HIV + women with an average age of 27 year old that the delivery type in 69% of cases was cesarean. Average weight of newborn at birth was 2894 g in average and the CD44 mean was reported equaled to 574 cell / μ L.

In final results 10 mothers (8/3%) transmitted HIV to their infants. Maternal viral load over than 1000 cop / mL had been associated with increased prevalence of HIV transmission to the newborn. Non-use of antiretroviral drugs had been associated with increased transmission (2). In a study which has been conducted by Diana, Hilda and colleagues (12) in Africa during 2004-2009 on the number of HIV+ women less than 45 years old, 62 persons were not affected by tenofovir in intrauterine life, 9 persons in 20-89% of the time, and 111 persons in more than 90 percent of the time were affected by the drug and had been often influenced by Zidovudine- Lamivudine. All 172 tested newborns were negative (10 persons were not test) that within 12 months had a total of 5% of deaths, and of 14 persons who died 6 persons had in total negative HIV and 8 persons were not tested (12). So all above these studies improve the results of this study that shows the use of prevention methods such as caesarean delivery for the birth of newborns in pregnant mothers with HIV and to avoid breastfeeding to the newborns, as well as treatment methods such as the use of prophylaxis and antiretroviral drugs can make the pregnant mothers hopeful to the birth of healthy newborns, and therefore severely reduced or completely stopped vertical transmission of this dangerous disease in the society. Of course other remarkable point is that according to the prescription of antiviral drugs for a relatively long time, especially in utero and at birth that the newborn has relatively weak defense and resistance systems, should be to evaluate completely and comprehensively in order to ensure lack of serious risks of taking these drugs in newborns that may be followed by greater concerns.

CONCLUSION

Direct relationship of HIV transmission with the three factors of delivery, nutrition, and receive treatment show that prescription of antiretroviral drugs is fully effective in pregnant mothers with HIV to prevent or reduce the transmission. Also the type of cesarean delivery rather than a vaginal delivery, as well as the use of powdered milk instead of breast milk can be useful in reducing transmission of HIV to the newborns. However it is recommended to carry out more comprehensive investigations with more samples in order to ensure the results.

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