ORIGINAL RESEARCH ARTICLE
pISSN 0976 3325 | eISSN 2229 6816
Open Access Article
www.njcmindia.org

Seroprevalence of Human Immunodeficiency Virus Infection in Antenatal Women at a Tertiary Care Hospital in Western India Trend of Twelve Years

Rajal V Thaker[1], Parul D Shah[2]

Financial Support: None declared
Conflict of Interest: None declared

How to cite this article:
Thaker RV, Shah PD. Seroprevalence of Human Immunodeficiency Virus Infection in Antenatal Women at a Tertiary Care Hospital in Western India – Trend Of Twelve Years. Natl J Community Med 2018;9(9):661-666

Author's Affiliation:
[1]Professor Dept of Obstetrics & Gynaecology; [2]Professor & Head Dept of Microbiology Smt N H L Municipal Medical College Ahmedabad

Correspondence
Dr Parul D Shah
Email: rvtpds@gmail.com

Date of Submission: 26-12-17
Date of Acceptance: 08-09-18
Date of Publication: 30-09-18

ABSTRACT

Background: In the absence of any intervention transmission of Human Immunodeficiency Virus (HIV) from a HIV positive mother to her child during pregnancy, labour, delivery or breastfeedingranges from 15%-45%. This rate can be reduced to below 5% with effective interventions[1].Present study was carried out to know the seroprevalence of HIV infection over twelve years amongst antenatal women attending a tertiary care hospital in western India along with analysis of their demographic data.

Methods: After due permission from Institutional Review Board,studywas carried out by analyzing the data of antenatal women in whom HIV testing was done as per National AIDS Control Organization (NACO) guidelines from 1/4/2004 to 31/03/2016.

Results: Overallseroprevalence of HIV infection amongst antenatal women was 0.31% and of 2014-2016 was 0.17%. Maximum number of women, 93(44.28%) were in age group of 25-29 years. Primigravida were 89(42.38%). Majority 165(78.57%) were from urban area.

Conclusion: Ours was a hospital-based study with limited sample size. The steady decline in seroprevalence of HIV could be attributed to effective awareness-education programs by NACO as well as efforts by the medical-paramedical staff and counselors at our institute.

Key Words: Seroprevalence, HIV, PPTCT

INTRODUCTION

Human Immunodeficiency Virus (HIV) infection has grown into a major public health problem during last few decades[1]. The transmission of HIV from a HIV-positive mother to her child during pregnancy, labour, delivery or breastfeeding is called mother-to-child transmission (MTCT). In the absence of any intervention, transmission rates range from 15%- 45%. This rate can be reduced to below 5% with effective interventions during the periods of pregnancy, labour, delivery and breastfeeding[1]. Universal screening of all pregnant women is cost effective and has demonstrated reduction in HIV mother to fetal transmission even in low prevalence setting.The present study was carried out to know the magnitude and trend of prevalence of HIV infection over twelve years amongst antenatal women attending a tertiary care hospital along with analysis of their demographic data. The trend of prevalence of HIV positive antenatal women gives an idea regarding impact of awareness and educational programs and efforts by medical-paramedical staff. Identification of HIV infection during pregnancy allows the infected woman to make an informed decision about continuing the pregnancy, about interventions to decrease the risk of mother to child transmission and to identify infected partners or to decrease the risk of transmission to uninfected partners.

MATERIAL AND METHODS

The Prevention of Parent to Child Transmission of HIV (PPTCT) programme was launched in India in the year 2002.[2]PPTCT program was started at our institute from November 2003. After due permission from Institutional Review Board (IRB) of our institute, secondary data analysiswas carried out, of data of 12 years, ie from 1/4/2004 to 31/3/2016 of all antenatal women attending tertiary care hospital of western India in whom HIV testing was done as per National AIDS Control Organization (NACO) guidelines, according to which, first test was carried out had high sensitivity and if positive, then second and third tests were carried out that had more specificity.These tests are qualitative tests that do not identify the stage of the disease.HIV testing of partners of the antenatal HIV positive women was also done as per guidelines.Counselors of PPTCT center of our institute collected the primary data. Data was maintained as per NACO guidelinesunder supervision of department of Microbiology as well as Obstetrics and Gynaecology. Monthly checking of all data was carried out. Monthly reporting of data was done to AIDS Control Society of Municipal Corporation and to NACO. Authenticity and quality of data is very good. Total entry of 210 HIV positive antenatal women has been done. All entries are complete and no data is discarded. Positive antenatal women were managed according to NACO guidelines.

OBSERVATIONS

During the study period, there were 66341 antenatal registrations. Out of these, there were 210 HIV positive antenatal women. During 2004–2016, seroprevalence of HIV infection amongst antenatal mothers was 0.31%.

As shown in Table1 and Chart1, during the study period seroprevalence of HIV among antenatal women was declining except for the years 2011-12 and 2012-13, where it rose to 0.51 and 0.50 respectively.

Table 1Trends of Seroprevalence of HIV in Antenatal Women over Twelve Years

Year	Antenatal women	HIV Positive	Seroprevalence (%)
2004-05	1741	07	0.40
2005-06	1848	08	0.43
2006-07	4450	09	0.20
2007-08	5215	17	0.32
2008-09	6647	17	0.25
2009-10	5220	21	0.40
2010-11	4769	20	0.41
2011-12	4117	21	0.51
2012-13	5780	29	0.50
2013-14	7827	27	0.34
2014-15	8947	16	0.17
2015-16	9780	18	0.18
Total	66341	210	0.31

Chart 1: Trends of Seroprevalence of HIV in Antenatal Women over Twelve Years

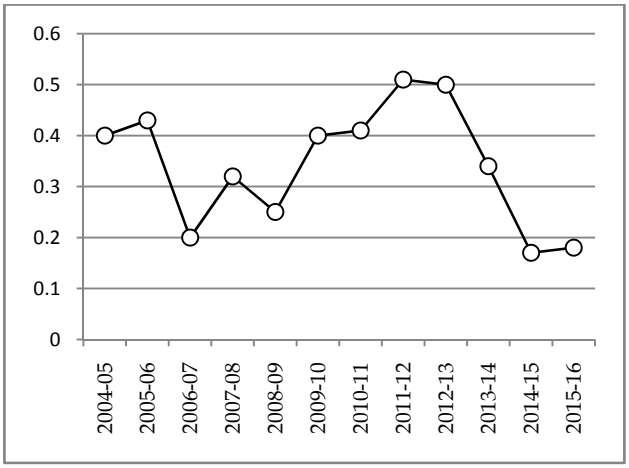

Table 2 Age Distribution of HIV positive Ante Natal Women*(N=210)

Year	15-19 (%)	20-24 (%)	25-29 (%)	30-34 (%)	35 & above (%)	Total
2004-05	0(0)	5(71.42)	1(14.28)	0(0)	1(14.28)	7
2005-06	1(12.50)	4(50)	3(37.50)	0(0)	0(0)	8
2006-07	1(11.11)	3(33.33)	4(44.44)	1(11.11)	0(0)	9
2007-08	0(0)	10(58.82)	5(29.41)	2(11.76)	0(0)	17
2008-09	0(0)	5(29.41)	12(70.58)	0(0)	0(0)	17
2009-10	2(9.52)	6(28.57)	12(57.14)	1(4.76)	0(0)	21
2010-11	0(0)	9(45)	8(40)	3(15)	0(0)	20
2011-12	2(9.52)	7(33.33)	9(42.85)	3(14.28)	0(0)	21
2012-13	4(13.79)	11(37.93)	11(37.93)	2(6.89)	1(3.44)	29
2013-14	1(3.70)	9(33.33)	17(62.96)	0(0)	0(0)	27
2014-15	1(6.25)	7(43.75)	7(43.75)	1(6.25)	0(0)	16
2015-16	2((11.11)	8(44.44)	4(22.22)	3(16.66)	1(5.55)	18
Total	14	84	93	16	3	210
%* (n=210)	6.66	40	44.28	7.61	1.42	

*Age wise Total percentage

Table 3 Gravidity of HIV positive Ante Natal Women (N = 210)

Year	Primi (%)	Second (%)	≥Three (%)	Total
2004-05	2(28.57)	3(42.85)	2(28.57)	7
2005-06	4(50.00)	3(37.50)	1(12.50)	8
2006-07	3(33.33)	2(22.22)	4(44.44)	9
2007-08	8(47.05)	6(35.29)	3(17.64)	17
2008-09	7(41.17)	9(52.94)	1(5.88)	17
2009-10	14(66.66)	6(28.57)	1(4.76)	21
2010-11	8(40.00)	9(45.00)	3(15.00)	20
2011-12	5(23.80)	11(52.38)	5(23.80)	21
2012-13	12(41.37)	9(31.03)	8(27.58)	29
2013-14	11(40.74)	8(29.62)	8(29.62)	27
2014-15	8(50.00)	5(31.25)	3(18.75)	16
2015-16	7(38.88)	10(55.55)	1(5.55)	18
Total	89	81	40	210
%*	42.38	38.51	19.04	

* Gravida wise total percentage

Table 4 Area of Residence of HIV Positive Ante Natal Women (N = 210)

Year	Urban (%)	Rural (%)	Total
2004-05	7(100)	0(0)	7
2005-06	8(100)	0(0)	8
2006-07	7(77.77)	2(22.22)	9
2007-08	14(82.35)	3(17.64)	17
2008-09	13(76.47)	4(23.52)	17
2009-10	18(85.71)	3(14.28)	21
2010-11	17(85.00)	3(15.00)	20
2011-12	16(76.19)	5(23.80)	21
2012-13	23(79.31)	6(20.68)	29
2013-14	19(70.37)	8(29.62)	27
2014-15	10(62.50)	6(37.5)	16
2015-16	13(72.22)	5(27.77)	18
Total	165	45	210
%*	78.57	21.42	

*Area wise Total percentage

Table 5: Level of Education of HIV Positive Ante Natal Women (N = 210)

Year	Nil (%)	Primary (%)	Secondary (%)	High School (%)	College (%)	Total
2004-05	0(0)	5(71.42)	1(14.28)	0(0)	1(14.28)	7
2005-06	1(12.50)	4(50)	3(37.50)	0(0)	0(0)	8
2006-07	1(11.11)	3(33.33)	4(44.44)	1(11.11)	0(0)	9
2007-08	0(0)	10(58.82)	5(29.41)	2(11.76)	0(0)	17
2008-09	0(0)	5(29.41)	12(70.58)	0(0)	0(0)	17
2009-10	2(9.52)	6(28.57)	12(57.14)	1(4.76)	0(0)	21
2010-11	0(0)	9(45)	8(40)	3(15)	0(0)	20
2011-12	2(9.52)	7(33.33)	9(42.85)	3(14.28)	0(0)	21
2012-13	4(13.79)	11(37.93)	11(37.93)	2(6.89)	1(3.44)	29
2013-14	1(3.70)	9(33.33)	17(62.96)	0(0)	0(0)	27
2014-15	1(6.25)	7(43.75)	7(43.75)	1(6.25)	0(0)	16
2015-16	2((11.11)	8(44.44)	4(22.22)	3(16.66)	1(5.55)	18
Total	14	84	93	16	3	210
%*	6.66	40	44.28	7.61	1.42	

*Education wise total percentage

After that, it declined and became 0.17 and 0.18 during last two years, 2014-15 and 2015-16respectively. Seroprevalence of HIV during 2014 – 2016, was 0.17%.As shown in Table 2, maximum number of HIV positive antenatal women, 93(44.28%) were in age group of 25-29 years and 177(84.28%) in the age group of 20-29 years. As shown in Table 3, 89(42.38%) were primigravida and 81(38.51%) were second gravida.As shown in Table 4, majority of HIV positive antenatal women, 165(78.57%) were from urban area.As shown in Table 5, only 5 (2.38%) each obtained high school and college level education.

Illiterate antenatal women with HIV were 69(32.85%). Primary and secondary education was present in 85(40.47%) and 46(21.90%) respectively. As shown in Table 6, history of blood transfusion in HIV positive antenatal women and her partner was present in 23(10.95%) and 5(2.38%) respectively. High-risk behavior (in form of multiple sex partners) in HIV positive antenatal women and her partner was present in 10(4.76%) and 27(12.85%) respectively. History of sexually transmitted infection (STI) was present in 6(2.85%) of HIV positive antenatal women and her partner. As shown in Table 7, partners of 206(98.09%) HIV positive antenatal women were counseled and tested. Out of them, 146(70.87%) were having positive result.

Table 6 Personal Histories of HIV Positive Ante Natal Women & Their Partners

Personal History	Antenatal Women (%)	Partner (%)
Blood Transfusion	23 (10.95)	5 (2.38)
Multiple Sex Partners	10 (4.76)	27 (12.85)
STI	6 (2.85)	6 (2.85)

Table 7: Results of HIV Testing of Partners of HIV Positive Ante Natal Women (N = 206)

Partner Testing	Antenatal Women (%)
Counseling	206 (98.09)
Testing	206 (98.09)
Reactive	146 (70.87)
Non Reactive	60 (29.12)

Table 8: Comparisons with Various Study Results of Seroprevalence of HIV in Antenatal Women in India

Study	Period	Region	Seroprevalence (%)
Uttar Pradesh			
Dwivedi S et al[4]	2005–16	Kanpur	0.3
Delhi			
Gupta S et al[5]	2003-06	Delhi	0.88
Radhika AG et al[6]	2002-15	Delhi	0.1–0.25
Punjab			
Sibia P et al[7]	2013-14	Patiala	1.03
West Bengal			
Goswami S et al[8]	2004–07	Kolkota	0.41–0.76
Mandal S et al[9]	2004-08	Siliguri	0.56
Bhadra B et al[10]	2009–13	Kalyani	0.065
Tamilnadu			
Parmeshwari S et al[11]	2009	Namakkal	0.77
Andhra Pradesh			
Devi A et al[12]	2012	Renga Reddy	0.45
Aljabri F et al[13]	2007–12	Hydrabad	0.27
Maharashtra			
Sarkate P et al[14]	2008–12	Mumbai	0.88
Patil VM et al[15]	2004-13	Dhule	0.44
Kwatra A et al[16]	2003–09	Loni	1.38
Giri P A et al[17]	2008-11	Loni	0.41
Mohite RV et al[18]	2003–12	Karad	2 – 0.2
Kulkarni S et al[19]	2013	Nanded	0.76
Sayare P et al[20]	2010-15	Akola	0.44
Odisha			
Nayak AK et al[21]	2014	Cuttack	0.50
Dash M et al[22]	2005-12	Behrampur	0.66
Rajsthan			
Mehta S et al[23]	2013-15	Jodhpur	0.16
Gujarat			
Patel SK et al[24]	2012-14	Ahmedabad	0.19
Jain M et al[25]	2012-17	Ahmedabad	0.46–0.27
Shah S et al[26]	2008-13	Ahmedabad	0.39
Khokhar N et al[27]	2011	Surat	0.39
Present Study	2004-16	Ahmedabad	0.31
	2014-16	Ahmedabad	0.17

DISCUSSION

As per NACO HSS 2014-15 the overall HIV prevalence among ANC clinic attendees, considered proxy for prevalence among general population, continues to be low at 0.29% (95% CI: 0.26%-0.32%). The highest prevalence was recorded in Nagaland (1.29%), followed by Mizoram (0.81%), Manipur (0.60%), Gujarat (0.56%) and Chhattisgarh (0.41%). Telangana (0.39%), Bihar (0.37%), Karnataka (0.36%) and Andhra Pradesh (0.33%) were other states, which recorded HIV prevalence more than the national average. Maharashtra (0.32%), Punjab (0.32%), Rajasthan (0.32%) and Tamil Nadu (0.27%) recorded HIV prevalence similar to the national prevalence. Haryana (0.25%), Delhi (0.25%) and Odisha (0.24%) recorded HIV prevalence slightly lower than the national average[2].

During the study period of twelve years (2004 – 2016), overall prevalence of HIV infection amongst antenatal women was 0.31% and seroprevalence for 2014-2016 was 0.17%.As per Gujarat State AIDS Control Society[3] (GSAC) annual report, in Gujarat during 2014-16, 0.07% of antenatal women were HIV positive.Gujarat is a medium prevalence state with concentrated type of HIV epidemic. The communication strategy of National AIDS Control Program -IV aims at effective behavior change of target groups with the help of simple albeit effective IEC materials. Providing Information, Education and Communication (IEC) to the masses, effective behavior change communication and mainstreaming to the vulnerable are the most effective strategies applied in the state. It focuses on reduction of stigma and discrimination attached with HIV infected people, and promotion of services to target group with special emphasis to youth and young women who are more vulnerable to HIV infection[3].

Table 8 shows seroprevalence of HIV amongst antenatal women in various parts of India and it shows decreasing trend over the years. Patel SK et al[24] have reported seroprevalence rate of 0.19% during 2012-2014. Jain M et al[25] have reported declining seroprevalence rate from 0.46% in 2012-2013 to 0.27% in 2016-2017. Shah S et al[26] have reported seroprevalence rate of 0.39% during 2008 – 2013. Khokhar N et al[27] have reported similar seroprevalence in 2011. Dwivedi S et al[4] have reported seroprevalence of 0.3% in their study of eleven years, 2005 – 2016. Patil V M et al[15] have reported seroprevalence of 0.44% in their study of ten years, 2004 – 2013. Dash M et al[22] have also reported overall 0.66% seroprevalence with decreasing trend from 1.53% in 2006 to 0.34% in 2012.

In present study, maximum number of antenatal women with HIV positive results, 93 (44.28%) were in age group of 25 – 29 years. Dash M et al[22] have also reported 42.14% antenatal women in age group of 25 – 29 years. In present study, in the age group of 20-29 years, 177(84.28%) were reported positive with HIV infection and only 9.03% were in age group of 30 years or more. Nayak AK et al[21] have reported 87.5% antenatal women in age group of 20-30 years, 12.5% in age group of 15-19 years and no women were reported in age group of more than 30 years. Patil VM et al[15] have reported only 0.6% antenatal women in age group above 34 years.

In present study, primi, second and third or more gravida were 89(42.38%), 81(38.51%) and 40 (19.04%) respectively. Nayak AK et al[21] have reported primi, second and third or more gravida as 25%, 62.5% and 12.5% respectively. Jain M et al[25] have reported similar trend that with increase in parity, prevalence of HIV decreases.

In present study, majority of antenatal women with HIV positive results, 165(78.57%) were from urban area. This is because; our hospital is situated in the city. Nayak AK etal[21] have reported urban and rural antenatal women with HIV positive result as 37.5.4% and 62.5% respectively.

In present study, illiterate antenatal women with HIV positive result were 69 (32.85%). Primary and secondary education was present in 85 (40.47%) and 46 (21.90%) respectively. Only 5 (2.38%) each obtained high school and college level education. Nayak AK et al[21] have reported level of education as illiterate, primary, secondary and higher as 25%, 0%, 46.4%, and 7.6% respectively. In a study by Dash M et al[22] majority of antenatal women were either illiterate or studied up to primary level. Seroprevalence of HIV infection is less amongst educated. If the level of education increases, there will be more awareness regarding HIV and its route of spread and thereby less chances of getting infection.

In present study, partners of 206(98.09%) were counseled and tested. Out of them, 146(70.87%) were having positive result. Radhika AG et al[6], Patel SK et al[24] and Jain M et al[25] have reported positive result in partners as 87.7%, 66.66% and 56.66% respectively.

In present study, history of blood transfusion in-HIV positive antenatal women and her partner was present in 23(10.95%) and 5(2.38%) respectively. History of multiple sex partners in HIV positive antenatal women and her partner was present in 10(4.76%) and 27(12.85%) respectively. History of sexually transmitted infection (STIs) was present in 6(2.85%) of antenatal women and her partner. The risk of acquiring HIV increases several fold with coexisting STIs because of the damages caused to the sexual organs by the STIs. Hence, prompt and early treatment of sexually transmitted infections is an important strategy for preventing as well as controlling HIV infection[3].Based on programme data, unprotected sex (87 % heterosexual) is the major route of HIV transmission, followed by transmission from Parent to Child (5%) and unknown cause (3.0%). Injecting Drug Use and behavior of Men having sex with men contribute 2% each to the transmission of HIV among individuals. Blood and Blood products contribute only 1% to the HIV transmission among the individuals[2].

Limitation:

Our study is a hospital-based study with limited sample size and is not representative of whole of state of Gujarat and India.

CONCLUSION

Although overall seroprevalence of HIV in antenatal women was 0.31%, same was 0.17% during 2014-2016. The steady decline in seroprevalence rate could be attributed to effective awareness and education programs by NACO as well as efforts by the medical-paramedical staff and counselors at Integrated Counseling Testing Center of our institute.

All antenatal seropositive women should be counseled regarding various modes of transmission of HIV, signs and symptoms of AIDS, their treatment and prevention of further transmission of HIV infection including perinatal transmission. Timely intervention can help to apply preventive strategies during pregnancy, delivery and breast-feeding and it will bring down MCT of HIV. They should also be counseled about proper disposal of their bio wastes, safe sex practices and use of barrier contraceptives.Continuous efforts in right direction can achieve the desired goal.

ACKNOWLEDGMENTS

We are thankful to IRB and AIDS Control Society of Ahmedabad Municipal Corporation. We are also thankful to Dean of NHL Municipal Medical College Dr P R Patel and Superintendent of Sheth V S General Hospital Dr S T Malhan for their support. We are also thankful to Ms Shilpa Patel for counseling and for excellent maintenance of records without which this work would have been impossible.

Institutional Review Board (IRB) of Smt N H L Municipal Medical College, Ahmedabad has approved study.

REFERENCES

1. Mother-to-child Transmission of HIV: World Health Organisation. Available from http://www.who.int/hiv/ topics/mtct/en/
2. HIV Data: National AIDS Control Organisation: Available fromhttp://www.naco.gov.in/sites/default/files/HIV%20 DATA.pdf
3. Gujarat State AIDS Control Society Annual Report 2015-16: Available from http://www.gsacsonline.org
4. Dwivedi S, Jahan U, Srivastava R, Agnihotri A. Trend of HIV seroprevalence among antenatal women at tertiary care hospital in North India, eleven years retrospective study. Int J Reprod Contracept Obstet Gynecol. 2017;6:537-43.
5. Gupta S, Gupta R, Singh S. Seroprevalence of HIV in pregnant women in North India: a tertiary care hospital based study. BMC Infect Dis. 2007;7:133.
6. Radhika AG, Chawla S, Bhaskaran S. Prevention of Parent to Child Transmission of HIV: Single Centre Experience of 14 years at Tertiary Care Hospital in Delhi, India. Journal of Clinical and Diagnostic Research. 2017; 11(8): QC04-QC07

7. Sibia P, Kaur MM, Kumar A. Seroprevalence of Human Immunodeficiency Virus in one of the institute of Northern India. Journal of Clinical and Diagnostic Research. 2016;10(9): QC08-QC09
8. Goswami S, Chakravorty PS. Prevention of parent to child transmission of HIV (PPTCT): An effort of 4 years in a Tertiary centre. The Journal of Obstetrics and Gynaecology of India. 2011;61(4) 394-398
9. Mandal S, Bhattacharya RN, Chkrabarty M etal. Evaluation of prevention of parent to child transmission programme in a rural tertiary hospital of West Bengal. Indian J Community Med. 2010;35(4):491-4.
10. Bhadra B, Sarkar D, Sarkar S etal. Prevalence of Human Immuno Deficiency Virus in Antenatal Mothers in Rural Tertiary Care Hospital. Journal of South Asian Federation of Obstetrics and Gynaecology. 2014;6(3):159-162
11. Parmeshwari S, Jacob MS, Vijaykumari J etal. A program on prevention of parent to child transmission program in a govt. hospital, Tiruchengode taluk, Namakkal District. Indian J Comm Med. 2009;34(3):261-3
12. Devi A, Shyamala R. The study of Seroprevalence of HIV in pregnant women in a teriary care hospital. Pharm Lett. 2012;4(6):1835-36.
13. Aljabri F, Saraswathi KS. The study of seroprevalence of HIV in pregnant women in a Tertiary Care Hospital, South India, Scholars Research Library Der Pharmacia Lettre. 2012;4(4):1103-4.
14. Sarkate P, Paranjpe S, Ingole N etal. Monitoring HIV Epidemic in Pregnant Women: Are the Current Measures Enough. J Sex Transm Disease.2015; 2015: 194831.
15. Patil VM etal. Ten years' trend of HIV seroprevalence among Indian pregnant women attending antenatal clinic at tertiary hospital in Dhule, Maharashtra, India Int J Reprod Contracept Obstet Gynecol. 2016;5(5):1514-1519.
16. Kwatra A, Bangal VB, Shinde K etal. HIV Seroprevalence among the pregnant population and utilization of integrated counseling and training centre facilities at a teaching hospital in Rural Maharashtra. Australian Medical Journal. 2011;4(10):566-570.
17. Giri PA, Bangal VB, Phalke DB. Pevalence of HIV among rural Pregnant women attending antenatal clinic at pravara Rural Hospital, Loni, Maharashtra, India. Int J Health Allied Sci. 2012;1(1):13-5.
18. Mohite RV, Mohite VR. Performance of prevention of parent to child transmission program: A decadal trend from rural Maharashtra, India. Indian J Sex Transm Dis 2016;37:52-7.
19. Kulkarni S, Doibale M. Trend of seroprevalence of HIV among antenatal clinic attendees at a tertiary care hospital. Int J Basic Appl Med Sci. 2013;3(1):257-62.
20. Sayare P, Ambhore N, Mantri R etal. Prevalence of HIV Infection among Pregnant Women in a Tertiary Care Hospital Akola, India. Int.J.Curr.Microbiol.App.Sci. 2017; 6(1): 691-696.
21. Nayak AK, Jain MK, Dhivya S etal. A study on prevalence of HIV infection among pregnant women attending antenatal clinic in a tertiary care hospital, Cuttack, India. Int J Community Med Public Health 2017;4:1504-9.
22. Dash M, Mohanty I, Sahu S etal. Declining HIV Seroprevalence among pregnant women in south Odisha, India: A six and half year tertiary care hospital based study. International Journal of Biomedical and Advance Research. 2012; 3(7): 546-552
23. Mehta S, Balgopal B, Mehta L. Seroprevalence of HIV in ANC clinic attendees and utilization of PPTCT services at a tertiary care hospital of Western Rajasthan, India. Int J Reprod Contracept Obstet Gynecol 2017;6:1590-5.
24. Patel SK, Kansara V, Aanand N etal. Prevalence of HIV in antenatal women at GMERS Medical College, Sola, Ahmedabad. Int J Reprod Contracept Obstet Gynecol. 2014; 3(3): 662-665
25. Jain M, Nimavat BK. To study the prevalence of HIV infection amongst antenatal women in a tertiary care hospital in Gujarat, India. Int J Reprod Contracept Obstet Gynecol 2017;6:3872-4.
26. Shah S, Trivedi Y, Morjaria K. Incidence of HIV in low risk population - antenatal women and rate of vertical transmission. Gujarat Medical Journal. 2015;70 (1):29-31
27. Khokar N, Jethwa D, Lunagaria R etal.Seroprevalence of Hepatitis B, Hepatitis C, Syphilis and HIV in pregnant women in a tertiary care hospital, Gujrat, India. Int J Curr Microbiol. 2015;4(9):188-94.