

Seroprevalence of HIV, HBsAg anti HCV and syphilis in subjects attending integrated counseling and testing centre for HIV at Bhaskar general hospital, RR District, Andhra Pradesh

Sarwat Fatima^{1*}, Shirish Vadodkar² and Pavan Kumar Kulkarni³

¹Department of Microbiology, Deccan College of Medical Sciences, Princess Esra Hospital, Shahlibanda, Hyderabad-500002 Andhra Pradesh, India, ²Department of Pathology, Bhaskar Medical College, MoinabadMandal, RR District-500045 Andhra Pradesh, India and ³Department of Community Medicine, Deccan College of Medical Sciences, Princess Esra Hospital, Shahlibanda, Hyderabad-500002 Andhra Pradesh, India

Abstract: *Aim:* The present study was undertaken to estimate the prevalence of HIV 1 and 2, Hepatitis B surface antigen, antibodies to Hepatitis C virus and antibody to Treponemapallidum among the people attending integrated counseling and testing centre at bhaskar general hospital & medical college RR district Andhra Pradesh. The main objective of the study was to emphasize the need of strengthening the existing awareness programmes for HIV in the rural & semiurban population, and integrating viral hepatitis and syphilis screening with ICTC's so that these infections are better prevented, diagnosed and treated earlier. *Materials & Methods:* Blood samples from 437 individuals attending ICTC; were collected between June to September 2009. Test for HIV was performed as per NACO guidelines and for other infections as per the manufacturer instructions. *Results:* Out of the 437 samples screened 8.2% of the tested people gave positive results for either of the infections like HIV 1, HBsAg, syphilis. Anti HCV could not be detected in the present study. The overall prevalence rates for HIV-1 was 4.1% ,HBsAg -1.1% syphilis 2.9% and antiHCV 0%. Among the various demographic factors like age, sex, marital status, literacy level & risk behavior ,age had a greater impact on the prevalence rates . Co infections were detected in 0.7% of the individuals in the form of HIV- syphilis - 0.45% and HIV – HBV in 0.22% in the people tested. Inantenatal women the prevalence rates were for HIV 1- 0.7%, HBV -1.3% and syphilis- 4%. *Conclusion:* The need to make rural& semi urban area people understand the need and benefits of getting tested as most of them are unaware of their serological status. Hence most of the infections go undetected.

Keywords: Seroprevalance, HIV, HBsAg, HCV, Syphilis, Co-infections, Antenatal

Introduction

In 2009, there were an estimated 2.6 million people who became newly infected with HIV and there are more than 39.5 million people living with HIV worldwide [1]. According to National AIDS Control Organization (NACO), number of people living with HIV in India in 2008 was 2.27 million with an estimated adults HIV prevalence of 0.29% [2]. The interaction of syphilis and HIV infection is complex and remains the subject of ongoing research [3]. Sexual transmission is the predominant mode of HIV transmission and is estimated to be the major risk for about 86% of those infected [4].

Acquired Immune Deficiency Syndrome (AIDS) is currently one of the leading causes of death

among 15 to 24 years adolescents and young adults. Reducing adolescent sexual risk behavior has become an international public health priority [5]. HIV, HBV, HCV are three distinct viruses. But they share a common mode of transmission & risk factors that is through sexual contact, blood & blood products and vertical transmission. Syphilis primarily a STI caused by Treponemapallidum; a bacterium shares the same route of transmission. Epidemiological studies have demonstrated that STI's including syphilis are associated with an increased risk of acquiring HIV [6]. Syphilis increases the risk of HIV acquisition and transmission, and patients with either sexually transmitted infection (STI) frequently attend

the same STI clinics. A high incidence rate of syphilis was observed among STI clinic attendees and this high rate of syphilis among STI patients is contributing to the spread of HIV-1 in India [7].

As it is known that presence of any form of sexually transmitted disease amongst men or women facilitates the occurrence of HIV it was decided that HIV testing services should be integrated with other routine clinical care services. Integration of HIV testing into routine clinical care has proven useful for expanding provider-initiated testing and counseling in a number of clinical settings [8]. People with genital ulcer have 3- 4 times an increased risk of acquiring HIV than normal individuals. Therefore periodic screening for viral STI's in syphilis cases and vice versa is strongly recommended [9]. Genital ulcerative disease appears to have a greater impact than non-ulcerative disease on occurrence of HIV epidemics. There is evidence that STDs increase the risk of HIV in men, however such evidence is equivocal for women. The present study was planned to estimate the prevalence of HIV, HBV, HCV & syphilis among ICTC attendees and to assess the socio-demographic determinants of the study subjects.

Material and Methods

Study design: A cross sectional study was carried out over a period of four months from June – September 2009. The sampling method used was Universal inclusive sampling. The sample providers were the various outpatient department of the hospital, antenatal clinic (ANC) and intervention clinics of Bhaskar general hospital & medical college Moinabad mandal RR district Andhra Pradesh. The inclusion criteria in the study were all referrals to ICTC for the first time, whether symptomatic or asymptomatic for HIV. Hence 437 samples received during this four months which were screened for HIV, HBV, HCV and syphilis.

Sampling technique: The sampling procedure commenced from 1st June and continued till the end of September 2009. Blood sample in 5ml quantity were collected aseptically after voluntary informed consent from 437 individuals assuring privacy & confidentiality. Serum was separated out in sterile aliquots and preserved at -20°C till testing.

Method of testing: Testing for HIV was carried out as per the NACO guidelines [10] i.e. strategy III using three ERS Elisa, Rapid & Simple test based on three different antigens or principle of the assay by Comb-AIDS, TRIDOT & EIA Combs provided by NACO APSACS [10]. Test for HBsAg and HCV was done using ERBALISA provided by (TransasiaBioMedicals Ltd ERBA diagnostics Mannheim GmbH, Germany). These are highly sensitive & specific 3rd & 4th generation indirect ELISA assays for HBV & HCV. For syphilis anti cardiolipin antibodies were checked by (RPR) Rapid plasma reagin test using the kit provided by Beacon diagnostics. Reactive samples were checked in dilutions for significant titre.

Statistical analysis: Permission from the Institutional Ethics Committee was taken prior to the start of the study. SPSS software version 16 was used for the statistical analysis. Chi-square test at significance level of 0.05 was used for testing the association between socio-demographic parameters and presence of HIV & syphilis.

Results

The results of the 437 samples screened for various infections and co infections in the study are shown in the tables 1-6.

Graph-1: Shows that 36 (8.2%) of the 437 subjects tested turned positive for either of the infections like HIV, HBV and syphilis.

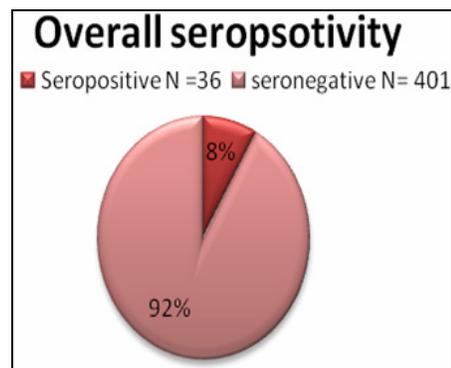


Table-1 shows the overall rates of positivity for various infections HIV- 1 was seen in 18 (4.1%), HBs Ag was positive in 5 (1.1%) and 13 (2.9%) were reactive for syphilis. None were reactive for antibodies to HCV by Elisa [Table -1].

Table-1: HIV, HBV, HCV and syphilis status of the subjects in the study

Infections	Status	Male N=166		Female N=271		Total N= 437	
HIV -1	Reactive	10	(6.02%)	8	(2.9%)	18	(4.1%)
	Non reactive	156	(94%)	263	(97%)	419	(96%)
HBV	Reactive	2	(1.2%)	3	(1.1%)	5	(1.1%)
	Non reactive	164	(99%)	268	(99%)	432	(99%)
HCV	Reactive	0	(0.00%)	0	(0.00%)	0	(0.00%)
	Non reactive	166	(100%)	271	(100%)	437	(100%)
Syphilis	Reactive	3	(2%)	10	(4%)	13	(3%)
	Non reactive	163	(98%)	261	(96%)	424	(97%)

Table-2: Syphilis status among the subjects in the study in relation to demographic factors

Socio demographic Profile		No. tested (%) N= 437		Males (%) N= 166		Females (%) N = 271	
Syphilis status		No. tested	Syphilis positive	No. tested	Syphilis positive	No. tested	Syphilis positive
Age	1-20	92 (21%)	5 (5.4%)	21 (13%)	1 (4.7%)	71(26%)	4 (5.6%)
	21- 40	262 (62%)	7 (3%)	107 (64%)	2 (1.8%)	162 (60%)	5 (3%)
	41-60	45 (10%)	1 (2.2%)	23 (14%)	0(0.00%)	22 (8%)	1 (4.5%)
	61-80	31 (7%)	0(0.00%)	15 (9%)	0(0.00%)	16(6%)	0(0.00%)
Sex	Male	166 (38%)	3 (2%)	166 (100%)	3 (1.8%)	271 (100%)	10 (3.6%)
	Female	271 (62%)	10 (3.6%)	0(0.00%)	0(0.00%)	0(0.00%)	0(0.00%)
Marital status	Married	338 (77%)	12 (4%)	122 (74%)	2 (2%)	216 (80%)	10 (4.6%)
	Unmarried	83 (19%)	1 (1.2%)	37 (22%)	1 (3%)	46 (17%)	0(0.00%)
	Divorce	7 (2%)	0(0.00%)	05(3%)	0(0.00%)	02(0.7%)	0(0.00%)
	Widow/ widower	9 (2%)	0(0.00%)	02 (1%)	0(0.00%)	07 (2.5%)	0(0.00%)
Literacy level	Illiterate	110 (25%)	0(0.00%)	42(25%)	0(0.00%)	68 (25%)	0(0.00%)
	To 5 th grade	139 (32%)	8 (6%)	61(37%)	2 (3%)	78(29%)	8 (10%)
	To 12 th grade	132 (30%)	4(3%)	33(20%)	1(3%)	99 (37%)	2 (2%)
	Graduate	56 (13%)	1 (2%)	30 (18%)	0(0.00%)	26 (10%)	0(0.00%)
Risk behavior	Present	50 (11%)	13 (26%)	38 (23%)	1 (3%)	12 (4%)	2 (0.7%)
	Absent	387 (89%)	0(0.00%)	128 (77%)	2 (2%)	259 (96%)	8 (3%)

Of the 437 patients 13 (2.9%) were reactive for syphilis. Majority of the subjects were in the age group 11-20 years 5 (5.4%) and 21-30 years 7 (3%). More number of females 10 (3%) than males 3 (2%) were positive for RPR test. the marital status showed that 12 (4%) of the married and 1 (1%) of the unmarried people were infected

with syphilis. The difference in syphilis positive status with respect to marital status was significant (P =0.05) between married and unmarried. About the literacy level 8 (6%) were semiliterate and 1 (2%) was graduate. Risk behavior was noted in all 13 reactive cases [Table -2].

Table-3: HIV status among the subjects in the study in relation to demographic factors							
Profile		No. tested (%) N= 437		Males (%) N= 166		Females (%) N = 271	
HIV status		No .tested	HIV positive	No. tested	HIV positive	No. tested	HIV positive
Age	1-20	92 (21%)	1 (1.08%)	21 (13%)	0(0.00%)	71(26%)	1(1.4%)
	21- 40	262 (62%)	17(62%)	107 (64%)	10 (93%)	162 (60%)	7 (4.3%)
	41-60	45 (10%)	0(0.00%)	23 (14%)	0(0.00%)	22 (8%)	0(0.00%)
	61-80	31(7%)	0(0.00%)	15 (9%)	0(0.00%)	16(6%)	0(0.00%)
Sex	Male	166 (38%)	10 (6%)	166 (100%)	10 (6%)	271 (100%)	8 (2.9%)
	Female	271 (62%)	8 (2.9%)	0(0.00%)	0(0.00%)	0(0.00%)	0(0.00%)
Marital status	Married	338 (77%)	11 (3.2%)	122 (74%)	6 (4.9%)	216 (80%)	5(2.3%)
	Unmarried	83(19%)	2(2.4%)	37 (22%)	2 (5.4)	46 (17%)	0(0.00%)
	Divorce	7 (2%)	2(0.28%)	05(3%)	1(20%)	02(0.7%)	1(50%)
	Widow/ widower	9 (2%)	3 (33.3%)	02 (1%)	1(50%)	07 (2.5%)	2 (28.5%)
Literacy level	Illiterate	110(25%)	6(5.4%)	42(25%)	3 (7%)	68 (25%)	3 (4.4%)
	To 5 th grade	139 (32%)	7 (5%)	61(37%)	4 (6.5%)	78(29%)	3 (3.8%)
	To 12 th grade	132 (30%)	4(3%)	33(20%)	2 (6%)	99 (37%)	2 (2%)
	Graduate	56 (13%)	1 (1.7%)	30 (18%)	1(3.3%)	26 (10%)	0(0.00%)
Risk behavior	Present	50 (11%)	17(34%)	38 (23%)	9 (24%)	12 (4%)	8 (67%)
	Absent	387 (89%)	1(0.25%)	128 (77%)	1 (7.2%)	259 (96%)	0 (0.00%)

Table-4: HBsAg status among the subjects in the study in relation to demographic factors							
Profile		No. tested (%) N= 437		Males (%) N= 166		Females (%) N = 271	
HBsAg Status		No. tested	HBsAg positive	No. tested	HBsAg positive	No. tested	HBsAg positive
Age	1-20	92 (21%)	0 (0.00%)	21 (13%)	0(0.00%)	71(26%)	0(0.00%)
	21- 40	262 (62%)	4 (1.4%)	107 (64%)	2 (1.8%)	162 (60%)	2 (1.23%)
	41-60	45 (10%)	1(2.2%)	23 (14%)	0(0.00%)	22 (8%)	1 (4.5%)
	61-80	31(7%)	0(0.00%)	15 (9%)	0(0.00%)	16(6%)	0(0.00%)
Sex	Male	166 (38%)	2 (1.2%)	166 (100%)	2 (1.2%)	271 (100%)	3 (1.1%)
	Female	271 (62%)	3(1.1%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0(0.00%)
Marital status	Married	338 (77%)	3 (0.88%)	122 (74%)	1 (0.8%)	216 (80%)	2 (0.9%)
	Unmarried	83(19%)	0 (0.00%)	37 (22%)	0 (0.00%)	46 (17%)	0(0.00%)
	Divorce	7 (2%)	1 (14.2%)	05(3%)	0 (0.00%)	02(0.7%)	0(0.00%)
	Widow/ widower	9 (2%)	1(11%)	02 (1%)	1 (50%)	07 (2.5%)	1 (14.2%)
Literacy level	Illiterate	110(25%)	0 (0.00%)	42(25%)	0 (0.00%)	68 (25%)	0(0.00%)
	To 5 th grade	139 (32%)	1 (0.71%)	61(37%)	1 (1.63%)	78(29%)	0(0.00%)
	To12 th grade	132 (30%)	3(2.27%)	33(20%)	1(3%)	99 (37%)	2 (2.02%)
	Graduate	56 (13%)	1 (1.7%)	30 (18%)	0 (0.00%)	26 (10%)	1(3.8%)
Risk behavior	Present	50 (11%)	2(4%)	38 (23%)	1 (4.3%)	12 (4%)	1(8.3%)
	Absent	387 (89%)	3 (0.77%)	128 (77%)	1 (0.78%)	259 (96%)	2 (0.77%)

Out of the 437 individuals screened 18 (4.1%) were reactive for HIV-1. None was HIV 2 reactive. Majority of the subjects 17 (6.3%) were in the age group 21-40 years and 1 (1.08%) in 11-20 years age. this difference in the HIV positivity with reference to age is significant. More number of males 10 (6%) and 8 (2.9%) than females were infected with HIV. There marital status showed majority of the widower / widow 3 (33.33%) than married people 11 (3.2%) were infected. The statistical difference in marital status is significant (P= 0.05). More number of illiterate 6 (5.4%) than literate people 1 (1.7%) were reactive for HIV1. Risk behavior was noted in 17 and absent in 1. This difference is marked (P = 0.05) [Table-3].

From the 437 samples screened HBsAg was positive in 5 (1.1%) of the subjects by elisa majority of the infected people were in the age group 41-60 years 1 (4%) and 3 (1.2%) in 21-40 years. There was no significant difference as to gender for HBV infection females 3 (1.2%) and males 2 (1.1 %). More number of 1(14.2%) widower and 1 (11%) of divorced were positive for HBV than married people 3 (0.8%) for HBV. Literacy level showed more of semiliterate and illiterate 3 (2.2%) than 1 (1.1%) of the graduate people. Risk behavior was present in 2 (4%) and absent in 3 (0.77%) of the population studied. This difference is significant (P= 0.05) [Table-4].

Table-5: Prevalence of infections in antenatal women

Result	HIV	HBsAg	HCV	Syphilis
Reactive	1 (0.7%)	2 (1.3%)	0 (0.00%)	8 (5.4%)
Non reactive	146 (99.3%)	145 (98%)	147 (100%)	141 (94.6%)

Prevalence rate for antenatal women showed 11 (7.4%) were positive for infections like HIV, HBV and syphilis. HIV was positive in 1 (0.7%), HBV 2 (1.3%) and RPR test for syphilis was reactive in 8 (5.4%). None were reactive for HCV [Table-5].

Table-6: Coinfections in the population studied

Co-infections	Positive	Negative
HIV- HBV	1 (0.22%)	436 (99.88%)
HIV- Syphilis	2 (0.45%)	435 (99.65%)

The overall prevalence rate for Co infections in the present study 3 (0.7%). Coinfections in the form of HIV-HBV were seen in 1 (0.22%) and HIV- Syphilis 2 (0.45%) [Table -6].

Discussion

Presently India is a home for 2.27 million HIV positive cases (UNAIDS 2010) [1]. Andhra pradesh lies in the six most high prevalence states next to Manipur (NACO online org.annual report 2010-11) [2], the main focus is now on the coinfections which are responsible for long term morbidity and mortality [11-14].

Analysis of our results revealed that of 437 individuals screened 36 (8.2%) of them tested positive for any one of the infections like HIV, HBV, HCV & syphilis. The overall prevalence rates for various infections were HIV 4.1%, HBV 1.1% HCV -0% Syphilis 2.9%. The prevalence rates of HIV 4.1% correlates well with one reported by [15-16] but deviates from the high prevalence rates of 8.8% reported by Okonko IO [16] which could be due to geographical influence on the HIV status as sub-Saharan Africa is home for HIV and right now is having an epidemic of HIV. In the present study HIV is the most common infection followed by syphilis and hepatitis B Virus infection which correlates well the study reported by [15-17]. Majority of the individuals attending the ICTC fell in the age group 21-40 years [15-17]. Viral STIs are more common in males 12 (7.2%) than in females 11 (4.05%) similar finding was noted by [15].

RPR test found a significant treponemal antibody titre in 13 (2.9%) of the tested individuals. None of the samples screened were reactive for antibodies to HCV. The prevalence rates for HCV varies with the population studied. In india a low prevalence rate has been reported 1.0% byhussain et al [15]. Off late HCV is emerging as the most dangerous coinfection in HIV positive individuals. Prevalence rates of 3% and 4% has been reported in india by SK Antala and Ramalingamsekar[16-18]. In the present study total absence of the anti HCV positive cases could be due to lack of professional blood

donors, haemophiliacs and intravenous drugs abusers and dialysis patients in whom a high prevalence rates have been reported. These low prevalence rates should not lessen our efforts in regular screening for viral STI's in HIV positive individuals as coinfections in the form of HIV-HCV are associated with increased morbidity and mortality [11-14]. Epidemiological studies showed HIV increases HCV disease progression, people with coinfections have high viral loads and increased risk of severe liver damage. HCV in turn affects HIV treatment as drug interactions are very common and leads to liver toxicity [19-20].

Analysis of our results showed that the various demographic factors studied age, sex, marital status, literacy level and risk behavior all had influenced the prevalence rates of HIV, HBV and syphilis in the population studied. This agrees with study by Hussainetal [15-17]. Among the various variables age emerged as the most important factor 29 out of 36 seropositive cases (81%) were in the age group 21-40 years and this correlates well with the study done by [15-17]. More number of married people were seropositive for syphilis 12 out of 13 (92%) on the contrary HIV and HBV were noted in high prevalence rates in widow or widowers and divorced people 28.5% and 14.2% [15].

Overall infections were more common in illiterate & semiliterate group than in the educated people 72.1%. A history of risk behavior in the form of substance abuse and heterosexual promiscuity was seen in 50 (11%) of the tested individuals. 22 (44%) of them were seropositive for either of the infections and most noticeable feature is that 22 (61.1%) of the seropositive cases had a history of risk behavior which is alarming. HIV infection was more common in males 10 (55.5%) than females 8 (44.6%) similar finding was seen in study done by [15-17] this could be because of large number of females 271 (68%) in the study than males 166 (38%). In the present study more number of females were positive for syphilis 10 (77%) out of 13 reactive. Again this could be due to large number of females in the study group. There was no specific gender variation in relation to hepatitis B virus infection .Syphilis was more prevalent in females 10 out of 13 reactive cases (77%) than males 3 (33%) which correlates with the study [15] and could be due to large number

of females in the study group. Co infections were noticed in 3 (0.7%) of the studied population and were seen in the form of HIV-Syphilis (0.45%) and HIV- HBV (0.22%) [15-16]. None of the samples were positive for HIV- HCV, HCV –Syphilis or HCV –HBV [18-20]. In the post HAART era were the life span of the aids patients has increased; the medical fraternity is faced with a new challenge i.e. diagnosis and management of coinfections which is possible only by implementing regular screening of these people and by integrating the screening for these infections with ICTC , PPTCT VCTC.

The prevalence rates of infection in antenatal women a low risk group were for HIV-0.7%, HBV 1.3% and syphilis 4%. High prevalence rates for HIV were reported by north Indian studies 1.23% [21-22], and a rate ranging from 0.95% - 2.23% from highly endemic regions of Africa Nigeria [23-24]. In a study by kumar et al [25] reported a prevalence rate of 1.1% from south India. Low prevalence rates in our study 0.7% correlate with [25] which indicates effective antenatal counseling, good awareness programmes and propagation of safe sex.

Conclusion

According to the present study 8.2% of the studied population is infected with either of the infections like HIV, HBV and syphilis. Among the four infections studied HIV is more common followed by syphilis and hepatitis B virus infection. None were infected with hepatitis C virus. All the demographic factors studied had an influence on the prevalence rates of these infections. And a substantial number of people harbor co infections. The prevalence rates for HIV are declining in antenatal women, which is a good indicator of better antenatal services and PPTCT programmes.

The need of the hour is to further strengthen the awareness programme, to achieve the NACO target of zero HIV positive cases for 2011-12 and to introduce regular viral hepatitis screening and syphilis screening by integrating it with ICTC, PPTCT or VCTC programmes. This will help in and improve the detection of these infections and co

infections at the earliest which influences both the treatment and outcome. As most of these infections if not tested remain undiagnosed and unknowingly it may get transmitted to the general population.

Acknowledgments

I deeply thank NACO APSACS for providing the kits and the management of Bhaskar medical college for providing the resources & the technical staff of ICTC & blood bank & microbiology lab without whose help the study was not possible.

References

- UNAIDS India- Country Progress Report, Geneva: Joint United Nations Programme on HIV/AIDS. http://data.unaids.org/pub/report/2010/india_2010_country_progress_report-en.pdf. 2010.
- Annual Report 2009-2010. Department of AIDS Control, Ministry of Health & Family Welfare. [cited 12 October, 2011] Available from: http://nacoonline.org/upload/AR202009-10/NACO_AR_English20corrected.pdf
- Hall CS, Klausner JD, Bolan GA. Managing Syphilis in the HIV-infected Patient. *Curr Infect Dis Rep*. 2004; 6:72-81.
- Darrow WW, Echenberg DF, Jaffe HW, OMalley PM, Byers RH, Getchell JP, Curran JW. Risk factors for human immunodeficiency virus (HIV) infections in homosexual men. *Am J public health* 1987; 77:479-83.
- Donenberg GR, Paikoff R, Pequegnat W. Introduction to the special section on families, youth, and HIV: Family-based intervention studies. *J Pediatr Psychol*. 2006; 31(9): 869-873.
- Nandan D, Bhattacharya M. Annual HIV Sentinel Surveillance Country Report 2006.
- Akinjogunla OJ and Adegoke AA seroprevalence of human immunodeficiency virus HIV-1/2 infections in UYO state metropolis AKwaIbom State. *Scientific Research and essay* 2009; 4(11): 1381-1384.
- Bassett IV, Walensky RP. Integrating HIV screening into routine health care in resource-limited settings. *Clin Infect Dis*. 2010; 50 (3):S77-S84.
- Incorporating HIV prevention into the medical care of persons living with HIV recommendations of CDC the health resource and services administration, the national institute of health and HIV medicine association of the infectious diseases society of the America *MMWR Recomm Rep* 2003; 52:1-24.
- NACO Guidelines on HIV Testing. New Delhi; *National AIDS Control Organisation*. www.nacoonline.org/about_NACO/Policy_Guidelines/policies_guidelines_Table for download. 2007.
- Munshi SU, Hoque MM, Mondol ME A, Jalaluddin M, Tabassum S, & Islam MN. HBV, HCV and syphilis coinfections in human immunodeficiency virus positive Bangladeshi patients observation at two reference laboratories. *IJMM* 2008; 26:282-283.
- Lynn WA & Lightman S. Syphilis and HIV a dangerous combination. *Lancet infect Dis*. 2004; 4:456-466.
- Lewden C, Salmon D, Morlat P, Bevlacqua S, Jouglu E, Bonnet F, Heripret L. Causes of death among human immunodeficiency infected adults in the era of potent antiretroviral therapy: emerging role of hepatitis and cancers, persistent role of AIDS. *IntJepidemiology* 2005; 34: 121-130.
- Gupta C & Singh S. Hepatitis B and C virus co infections in human immunodeficiency virus positive north Indian patients. *World J Gastroenterol* 2006; 12: 6879-6883.
- Hussain T, Kulshetra KK, Shikha V S HIV, HBV, HCV and syphilis co infections among patients attending the STD clinics of district hospitals in north India. *Int.J. Of Infect. Dis* 2006; 10:358-363.
- Okonko IO, Anugeje KC and Adeniji FO. Syphilis and HIV HCV and HBsAg co-infections among sexually active adults. *Nature and Science* 2012; 10(1): 66-74.
- Antala SK, Joshi TK. Seroprevalence of Hepatitis B, Hepatitis C and Syphilis in HIV positive cases at ICTC, Rajkot. *Gujrat Medical Journal* 2010; 65(1): 23-26.
- Ramalingam Sekar, Murugesanamudhanetal. Higher prevalence of sexually transmissible coinfections among the human immunodeficiency virus infected population of south India. *J Med Microbiol* 2011; 60(3):394-395.
- Karamochkine M, Carrat F et al. A case control study of risk factors for hepatitis c infection in patients with unexplained routes of transmission. *J of viral hepatology* 2006; 13(11):775-782.
- Roberts WB. Microbiology with disease by body system 2nd edition pearson education *inv. snfrancisco* 2009;714-50.
- Celanto DD. Is HIV screening in the labour and delivery unit feasible and acceptable in low income setup. *PLOS Med* 2008; 5(5):107.
- Gupta S, Gupta R and Singh S. Seroprevalence of HIV in pregnant women in North India: a tertiary care hospital based study. *BMC Infect Dis*. 2007; 7:133.
- Mirnda AE, Alves MC, Neto RL. Seroprevalence of HIV, Hepatitis B and syphilis in women at their first visit to PU. *Sex. Trans Dis* 2001; 28:710-3.
- Valadez, JJ, Loolpait PM et al. HIV and syphilis serostatus of antenatals in traditional Maasai pastoralist communities in Kajiado District, Kenya: 1989-1992. *Tropical Doctor*, 1999; 29:94-98.
- Kumar R, Jha P, Arora P, Mony P. Trends in HIV-1 in young adults in south India from 2000-2004 a prevalence study. *International studies of HIV/AIDS ISHA Lancet* 2006; 367:1164-1172.

*All correspondences to: Dr. Sarwat Fatima, Professor, Department of Microbiology, Deccan College of Medical Sciences, Princess Esra Hospital, Shahlibanda, Hyderabad-500002 Andhra Pradesh, India. Email ID: drsarwatfatima_micro@yahoo.co.in