

A study on prevalence of HIV and its associated risk factors in patients visiting tertiary care center of North India



Astha¹, Arti Agrawal², Ankita Soni³, Neetu Chauhan⁴, Priyanka Sahu⁵, Sanjeev Kumar⁶

^{1,2}Assistant Professor, ³Technical Officer, Department of Microbiology, ⁴Assistant Professor, Department of Transfusion Medicine, Sarojini Naidu Medical College, Agra, ⁵Statistician, Department of Community Medicine, Government Medical College, Budaun, ⁶Junior Resident, Viral Diagnostic and Research Laboratory, Department of Microbiology, Sarojini Naidu Medical College, Agra, Uttar Pradesh, India

Submission: 25-06-2022

Revision: 31-11-2022

Publication: 01-01-2023

ABSTRACT

Background: India is home to the second largest population of people living with human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) with an estimated 5.134 million infections. HIV has infected > 75 million people worldwide, with an estimated 37 million people now living with the virus making it the major cause of morbidity and mortality worldwide. HIV is a significant public health problem with tremendous social and economic implications. **Aims and Objectives:** Our primary aim is to estimate the prevalence of HIV infection and the associated risk factors of HIV infection. **Materials and Methods:** This is a retrospective study of the patients who visited in integrated counseling and testing center (ICTC) and State Reference Laboratory at a tertiary care center of Agra, Uttar Pradesh from January 2017 to December 2021. The data are in accordance with NACO portal. **Results:** The highest HIV seropositivity was observed in 35–49 years age group in both males and females in three consecutive years 2017, 2018, and 2019, respectively. HIV seropositivity in males decreased from 8.3% in 2017 to 4.9% in 2021 and in females from 6.0% to 4.6%. The most seropositives belong to married population (41.2%) and the least in divorced population (4.2%). Overall, housewives (20.7%) were maximally affected by HIV seropositivity, followed by skilled workers (15.8%) and unemployed/retired persons (15.7%). Uneducated population had maximum seropositivity rate (35.3%). Majority of HIV positives were heterosexual non-commercial partner (47.4%), while the homosexuals were the least (1.8%) affected. **Conclusion:** This study highlights the most affected group of HIV seropositive population and their risk behavior. Thus, by making ICTC, more accessible to ramp up the focused screening and prevention efforts for the suspected HIV population and evolving the appropriate policies/strategies for public awareness program will help to reduce the spread of HIV infection among the masses.

Key words: Human immunodeficiency virus; Acquired immune deficiency syndrome; Integrated counseling and testing center; SRL

INTRODUCTION

In India, human immunodeficiency virus (HIV) infection was detected first among female sex workers in 1986 in Chennai.¹⁻³ The HIV belongs to the genus *Lentivirus* within the family of *Retroviridae* and subfamily of *Orthoretrovirinae*.⁴ HIV infection eventually overwhelms the immune system and develops into acquired immune

deficiency syndrome (AIDS); however, in patients using antiretroviral therapy (ART) consistently, the HIV virus is impeded from extending and wrecking the immune system and ART assists in retaining the body strength by helping fight off life-threatening infections and preventing HIV from progressing to AIDS.⁵ Hence, timely diagnosis of HIV positive patient and assessment of associated risk factors is very crucial in appropriate management of the

Access this article online

Website:

<http://nepjol.info/index.php/AJMS>

DOI: 10.3126/ajms.v14i1.45997

E-ISSN: 2091-0576

P-ISSN: 2467-9100

Copyright (c) 2023 Asian Journal of Medical Sciences



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

Address for Correspondence:

Dr. Sanjeev Kumar, Junior Resident, Viral Diagnostic and Research Laboratory, Department of Microbiology, Sarojini Naidu Medical College, Agra - 282 002, Uttar Pradesh, India. **Mobile:** +91-9759794590. **E-mail:** sanjeevchaudhary.aiims@gmail.com

patient and to avert the spread of HIV infection to other people in the community.

Aims and objectives

The present study was conducted to estimate the prevalence of HIV infection among the clients attending integrated counseling and testing center (ICTC) for HIV screening and to identify risk factors associated with HIV infection among these clients which could assist in further planning and organizing HIV control in India.

MATERIALS AND METHODS

Study design

A cross-sectional retrospective study was conducted in the Department of Microbiology of S.N. Medical College, Agra, India from January 2017 to December 2021 after obtaining ethical approval from the Institutional Ethics Committee vide letter number-SNMC/IEC/2022/10.

Study population

All clients attending ICTC for HIV screening on a voluntary basis or those referred by the clinicians from various departments of the hospital during the 5 year study period from January 2017 to December 2021 formed the study population. Inclusion criteria were to incorporate the clients who volunteered for HIV testing and written informed consent was obtained from them before HIV testing. Exclusion criteria included clients who were averse to participate in the study.

Tools used for data collection

Confidential interviews were conducted personally with participants in the counselor room to collect the data about their sociodemographic background and behavioral variables that may be associated with the occurrence of HIV. Sociodemographic information included age, gender, education, occupation, and marital status. Men were also asked if they had visited sex workers or had had sex with men. Information was obtained about history of blood transfusion, use of injection or other drugs, and having sex with multiple partners.

Sample collection and processing

All participants underwent pre-test HIV counseling by certified counselor and blood sample was collected by Venipuncture. As per the strategy and policy prescribed by NACO, three tests were performed on serum samples of participants for diagnosis of HIV by three rapid HIV test kits (Meril Diagnostics TREDRO™ HIV 1-2 Ab, VOXPRESS HIV 1 and 2 Rapid Test VOXTUR BIO LTD., and COMBAIDS®-RS Advantage-ST HIV 1+2 immunodot test ARKRAY Healthcare Pvt. Ltd.). A test was considered positive for HIV when all the three rapid tests showed positive result. The participants involved in

the study were provided free access to medical consultation, essential drugs, and post-test HIV counseling.

Statistical analysis

The data for this study were collected from the ICTC/State Reference Laboratory of Department of Microbiology, Sarojini Naidu Medical College, Agra. It was validated and cleaned for analysis. Further, statistical analysis was done using SPSS software version 2.5. The observations pertaining to the qualitative parameters under study group were expressed in frequencies and percentages. Categorical data were compared using the Chi-square test to find the association among different variables. $P < 0.05$ was considered statistically significant. Unadjusted frequencies of positive screening through various kits among total screening tests done were calculated with 95% confidence interval. Adjusted odds ratio was calculated using positive HIV result as a dependent variable, and age and gender as the independent variables at 95% confidence interval by applying multivariate binary logistic regression analysis. Confounding factors were also scrutinized to run the analysis.

RESULTS

A total of 74,018 clients were counseled by ICTC counselors during 2017–2021 from Agra and adjoining districts. Increasing number of population was observed attending ICTC at our center during consecutive years 14,268 (2017), 17,554 (2018), 20,562 (2019), except 8729 (2020), and 12,905 (2021) due to COVID-19 restrictions, as shown in Table 1.

There was persistent difference in males and females ratio; 1.27:1 (2017), 1.54:1 (2018), 1.56:1 (2019), and 1.51:1 (2020) and 1.64:1 (2021) attending ICTC, as shown in Tables 2 and 3. It shows more seropositivity in males as compared to females. HIV seropositivity was the highest in 2017 in study population.

Figure 1 shows that the overall seropositivity in 2017, 2018, 2019, 2020, and 2021 was 4.40%, 2.50%, 2.80%, 3.30%, and 3.20%, respectively.

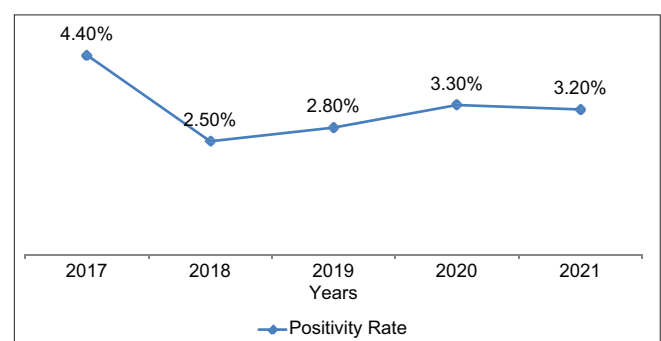


Figure 1: Positivity rate of total HIV Patients year wise

Table 1: Characteristics of the study population

Age in years	2017		2018		2019		2020		2021	
	n	%	n	%	n	%	n	%	n	%
0–14	1751	12.3	1549	8.8	1385	6.7	513	5.9	616	4.8
15–24	2801	19.6	3607	20.5	4257	20.7	1593	18.2	2553	19.8
25–34	3523	24.7	4122	23.5	3958	19.2	1740	19.9	2745	21.3
35–49	3256	22.8	3913	22.3	4799	23.3	2072	23.7	2924	22.7
≥50	2937	20.6	4363	24.9	6163	30.0	2811	32.2	4067	31.5
Total	14268		17554		20562		8729		12905	
Gender	2017		2018		2019		2020		2021	
	n	%	n	%	n	%	n	%	n	%
Male	8444	59.2	9809	55.9	12132	59.0	5137	58.8	7294	56.5
Female	5824	40.8	7745	44.1	8430	41.0	3592	41.2	5611	43.5
Total	14268		17554		20562		8729		12905	

Table 2: Age- and sex-wise positivity rates among HIV seropositives

Year	Age in years	Male			Female		
		HIV+ve	N	HIV prevalence (%)	HIV+ve	n	HIV prevalence (%)
2017	0–14	26	1029	2.5	13	722	1.8
	15–24	45	1582	2.8	28	1219	2.2
	25–34	98	2096	4.6	60	1427	4.2
	35–49	163	1959	8.3	78	1297	6.0
	≥50	72	1778	4.8	39	1159	3.3
	Total	404	8444	4.7	218	5824	3.7
2018	0–14	15	908	1.6	8	641	1.2
	15–24	36	1954	1.8	21	1653	1.2
	25–34	90	2308	3.8	49	1814	2.7
	35–49	95	2114	4.4	59	1799	3.2
	≥50	57	2525	2.2	17	1838	0.9
	Total	293	9809	2.9	154	7745	1.9
2019	0–14	17	772	2.2	7	613	1.1
	15–24	51	2213	2.3	17	2044	0.8
	25–34	105	2285	4.6	53	1673	3.2
	35–49	163	2954	5.5	75	1845	4.1
	≥50	67	3908	1.7	27	2255	1.2
	Total	403	12132	3.3	179	8430	2.1
2020	0–14	6	262	2.3	5	251	2.0
	15–24	18	800	2.3	5	793	0.6
	25–34	63	986	6.4	26	754	3.4
	35–49	76	1319	5.8	39	753	5.2
	≥50	33	1770	1.9	14	1041	1.3
	Total	196	5137	3.8	89	3592	2.5
2021	0–14	16	317	5.0	8	299	2.7
	15–24	23	1193	1.9	9	1360	0.7
	25–34	99	1455	6.8	37	1290	2.9
	35–49	86	1754	4.9	54	1170	4.6
	≥50	58	2575	2.3	25	1492	1.7
	Total	282	7294	3.9	133	5611	2.4

*Percentage is the HIV positivity rate among various age groups and genders

In 2017, HIV seronegativity was the highest in 25–34 years of age group in both males (1998) and females (1367), while it was maximum in >50 years of age group population in 2018, 2019, 2020, and 2021, respectively, as shown in Table 2. Overall HIV prevalence was the highest among both sexes in 35–49 years of age group during 2017, 2018, and 2019. In males, the prevalence was highest in 25–34 years age group during 2020 and 2021 which was 6.4% and 6.8%, respectively, while, in females, highest HIV

seroprevalence was 5.2% and 4.6% in year 2020 and 2021, respectively, as depicted in Table 2. HIV seropositivity in males decreased from 8.3% in 2017 to 4.9% in 2021 and in females from 6% to 4.6%.

Table 4 shows the highest seropositivity in uneducated population (35.3%) and least in population having higher qualification (13.7%). HIV seropositivity was observed maximum in married population (41.2%) while minimum

Table 3: Epidemiological profile of HIV positive population year-wise				
Year	Variable	HIV positive n (%)	HIV negative	Adjusted odds ratio
2017	Age (in years)			
	0–14	39 (2.2)	1712	1
	15–24	73 (2.6)	2728	1.18 (0.79–1.75)
	25–34	158 (4.5)	3365	2.05 (1.44–2.93)
	35–49	241 (7.4)	3015	3.50 (2.48–4.93)
	≥50	111 (3.8)	2826	1.71 (1.18–2.48)
	Total	622 (4.4)	13646	
	Gender			
	Male	404 (4.8)	8040	1.27 (1.07–1.50)
	Female	218 (3.7)	5606	1
2018	Age (in years)			
	0–14	23 (1.5)	1526	1
	15–24	57 (1.6)	3550	1.08 (0.66–1.76)
	25–34	139 (3.4)	3983	2.34 (1.50–3.65)
	35–49	154 (3.9)	3759	2.77 (1.78–4.31)
	≥50	74 (1.7)	4289	1.14 (0.71–1.84)
	Total	447 (2.5)	17107	
	Gender			
	Male	293 (3.0)	9516	1.54 (1.26–1.88)
	Female	154 (2.0)	7591	1
2019	Age (in years)			
	0–14	24 (1.7)	1361	1
	15–24	68 (1.6)	4189	0.93 (0.58–1.49)
	25–34	158 (4.0)	3800	2.34 (1.51–3.61)
	35–49	238 (5.0)	4561	2.89 (1.89–4.41)
	≥50	94 (1.5)	6069	0.85 (0.54–1.33)
	Total	582 (2.8)	19980	
	Gender			
	Male	403 (3.3)	11729	1.56 (1.30–1.86)
	Female	179 (2.1)	8251	1
2020	Age (in years)			
	0–14	11 (2.1)	502	1
	15–24	23 (1.4)	1570	0.67 (0.32–1.38)
	25–34	89 (5.1)	1651	2.40 (1.27–4.54)
	35–49	115 (5.6)	1957	2.55 (1.36–4.78)
	≥50	47 (1.7)	2764	0.74 (0.38–1.43)
	Total	285 (3.3)	8444	
	Gender			
	Male	196 (3.8)	4941	1.51 (1.16–1.95)
	Female	89 (2.5)	3503	1
2021	Age (in years)			
	0–14	24 (3.9)	592	1
	15–24	32 (1.3)	2521	0.32 (0.18–0.54)
	25–34	136 (5.0)	2609	1.27 (0.82–1.99)
	35–49	140 (4.8)	2784	1.19 (0.76–1.85)
	≥50	83 (2.0)	3984	0.48 (0.30–0.77)
	Total	415 (3.2)	12490	
	Gender			
	Male	282 (3.9)	7012	1.64 (1.33–2.03)
	Female	133 (2.4)	5478	1
Total	415 (3.2)	12490		

in divorced population (4.2%). Overall house wives (20.7%) were maximally affected by HIV seropositivity followed by skilled workers (15.8%). Majority of HIV positives were heterosexual non-commercial partners (47.4%) followed by heterosexual regular partner/spouse (18.4%) seropositivity, as depicted in Table 4.

HIV seropositivity was observed least in homosexuals (1.8%). In 2017 and 2018, HIV in heterosexual commercial partner outnumbered the heterosexual regular partner/spouse, while during 2020, 2021, and 2022, heterosexual regular partner/spouse group outnumbered as compared to heterosexual commercial partner group, as shown in Table 4.

Table 4: Pattern of education, marital status, occupation, and risk behaviors in HIV seropositives

Education status	2017	2018	2019	2020	2021	n (%)
Education in HIV seropositives						
Uneducated	127 (20.42)	86 (19.23)	277 (47.59)	155 (54.37)	184 (44.34)	829 (35.26)
Primary	126 (20.35)	98 (21.92)	98 (16.84)	31 (10.87)	45 (10.84)	398 (16.92)
Secondary	123 (19.79)	88 (19.68)	116 (19.93)	47 (16.49)	82 (19.76)	456 (19.39)
High secondary	124 (19.93)	97 (21.70)	36 (6.18)	32 (11.23)	58 (13.97)	347 (14.76)
College and above	122 (19.61)	78 (17.44)	55 (9.45)	20 (7.02)	46 (11.08)	321 (13.65)
Total	622	447	582	285	415	2351
Marital status in HIV seropositives						
Married	162 (26.04)	88 (19.68)	364 (62.54)	144 (50.52)	211 (50.84)	969 (41.22)
Unmarried	211 (53.92)	151 (33.78)	128 (21.99)	63 (22.10)	114 (27.96)	667 (28.37)
Separated	78 (12.54)	60 (13.42)	13 (2.23)	23 (8.07)	31 (7.48)	205 (8.72)
Divorced	43 (6.91)	35 (7.83)	6 (1.03)	3 (1.05)	12 (2.89)	99 (4.21)
Widow	128 (20.58)	113 (25.27)	71 (12.19)	52 (18.24)	47 (11.32)	411 (17.48)
Total	622	447	582	285	415	2351
Distribution of HIV seropositives by occupation						
Agricultural cultivator	2 (0.32)	3 (0.67)	1 (0.17)	0 (0)	22 (5.3)	28 (1.19)
Agricultural laborers	60 (9.64)	32 (7.15)	47 (8.07)	28 (9.82)	0 (0)	167 (7.10)
Domestic servant	4 (0.64)	2 (0.44)	2 (0.30)	0 (0)	0 (0)	8 (0.34)
Hotel staff	9 (1.44)	5 (1.11)	13 (2.23)	8 (2.80)	15 (3.6)	50 (2.13)
Housewife	124 (19.93)	95 (21.25)	127 (21.82)	52 (18.24)	89 (21.44)	487 (20.71)
Auto/taxi driver	32 (5.14)	25 (5.59)	31 (5.32)	12 (4.21)	15 (3.61)	115 (4.89)
Non-agricultural laborer	30 (4.82)	20 (4.47)	33 (5.67)	0 (0)	0 (0)	83 (3.53)
Business/self-employed	34 (5.46)	20 (4.47)	26 (4.46)	8 (2.8)	29 (6.98)	117 (4.98)
Semi-skilled worker	13 (2.09)	9 (2.01)	12 (2.06)	2 (0.70)	0 (0)	36 (1.53)
Service (Government/Private)	65 (10.45)	44 (9.84)	53 (9.10)	18 (6.31)	39 (9.39)	219 (9.32)
Skilled worker	78 (12.54)	67 (14.98)	81 (13.91)	71 (24.04)	74 (17.83)	371 (15.78)
Student	31 (4.98)	25 (5.59)	29 (4.98)	12 (4.2)	27 (6.50)	124 (5.27)
Truck driver/helper	14 (2.25)	9 (2.01)	13 (2.23)	6 (2.10)	14 (3.37)	56 (2.38)
Unemployed/retired	81 (13.02)	61 (13.64)	70 (12.02)	66 (23.15)	91 (21.92)	369 (15.69)
Others	45 (7.25)	30 (6.11)	44 (7.56)	2 (0.70)	0 (0)	121 (5.15)
Total	622	447	582	285	415	2351
Pattern of risk behavior among HIV seropositives						
Heterosexual non-commercial partner	230 (36.97)	88 (19.68)	366 (62.88)	170 (59.64)	261 (62.89)	1115 (47.43)
Heterosexual commercial partner	99 (15.91)	95 (21.25)	33 (5.67)	21 (7.36)	11 (2.65)	259 (11.02)
Heterosexual regular partner/spouse	75 (12.057)	75 (16.77)	136 (23.36)	59 (20.70)	87 (20.96)	432 (18.38)
Unknown	59 (9.48)	63 (14.09)	11 (1.89)	13 (4.56)	0 (0)	146 (6.21)
Parent to child	28 (4.50)	21 (4.69)	20 (3.43)	9 (3.15)	25 (6.02)	103 (4.38)
Blood product	71 (11.41)	56 (12.52)	14 (2.40)	13 (4.56)	24 (5.78)	178 (7.57)
Infected syringe and needle	45 (7.23)	29 (6.48)	2 (0.34)	0 (0)	0 (0)	76 (3.23)
Homosexual	15 (2.41)	20 (4.47)	0 (0)	0 (0)	7 (1.68)	42 (1.79)
Total	622	447	582	285 (1)	415	2351 (100)

DISCUSSION

This retrospective study was conducted on the study population attending ICTC center in a medical college of North India to estimate the prevalence and associated risk factors of HIV infection. Total number of population attending ICTC during 2017–2021 was 74,018. Increasing number of attendees were observed in successive years from 2017 to 2019, while the number of attendees dropped in subsequent years 2020 and 2021 due to COVID-19 restrictions. Among these, 42,816 (57.84%) were males and 31,202 (42.15%) were females; however, the study by Nayak et al.,⁶ revealed that attending population were 61.6% females and 38.4% males. Although another study revealed 65.5% males and 34.3% females as attending population which is in accordance with the studies conducted by Ramchandran et al.⁷ These figures are due

to the ignorance of minor health issues of females in our community.

A declining trend of HIV seropositivity in females has been observed from 3.7% in 2017 to 2.4% in 2021 in our study. These findings are in contrary to the finding of study by Hazarika et al.,⁸ in which increasing trend of seropositivity was observed from 3.78% in year 2008–2009 to 6.93% in year 2014–2015. This may be due to increasing awareness of the study population and use of barrier methods of contraception, which also helps in prevention of HIV/STD's.

Highest HIV seropositivity, that is, 5.3% was in 35–49 years age group followed by 4.4% in 25–34 years age group, as shown in Table 3. These findings are in concordance with the findings of Dandona et al.,⁹ our study is also supported

by the Madkar et al.,¹⁰ where the prevalence of HIV seropositivity was highest in the age group of 30–39 years followed by 22–29 years age group. Seropositivity in these two age groups is higher as they are sexually active and more concerned to attend ICTC or health care facilities.

HIV seropositivity among males was 3.7% as compared to females (2.5%). Thus, overall seropositivity rates in males are 1.5 times as compared to females. This finding is similar to observation in study conducted by Singh,¹¹ in which overall seropositivity rate is about 1.5 times higher in males as compared to females. Another study by Madkar et al.,¹⁰ revealed HIV seropositivity in male-to-female was 3:1. These findings may be due to the facts that females are not encouraged to attend health care facilities from family side in our community.

Maximum attendees of ICTC belong to more than 50 years of age group, as they may be viewed as more conscious and responsible individuals toward their health care.

Married population constitutes 41.2% among HIV seropositives in our study. Similar pattern of higher seropositivity among married population in both males and females was noticed in a study by Dandona et al.,⁹ and Vyas et al.,¹²

Highest seropositivity among uneducated population was 35.3%, least in population having higher qualification (13.7%) in our study. Similarly higher seroprevalence was observed in uneducated as compared to literates in study by Ramchandran et al.,⁷ basically due to unawareness of modes of transmission. This depicts that ignorance is a significant factor that leads to multiplication of the disease affected individuals.

Regarding occupational status the HIV seropositivity was highest among house wives, that is, 20.7% followed by skilled worker (15.8%). In study by Ramchandran et al.,⁷ HIV seropositivity in unemployed was 5.4%. HIV seropositivity among risk behavior was outnumbered in heterosexual groups which are also in concordant with the study of Hazarika et al.,⁸ and Vyas et al.,¹² and unprotected sexual contacts may be the seed.

Analysis of risk behavior among HIV seropositives from 2017 to 2021 revealed that heterosexual contact (76.8%) is the main mode of transmission in our study. In the study by Lal et al.,¹³ the prevalence among heterosexual is 84% in India and nearly similar prevalence rate of 81.6% among heterosexual was also observed by Vyas et al.¹² Furthermore, the proportion of HIV seropositives in heterosexual non-commercial partner has increased substantially from 36.97% in 2017 to 62.89% in 2021,

while in heterosexual commercial partner transmission has decreased from 15.91% in 2017 to 2.6% in 2021.

HIV transmission through blood products dropped from 11.4% in 2017 to 5.7% in 2021 which seems due to the performance of advanced and modern screening facilities of blood banks. The observed rate of HIV transmission in another study by Jordar et al.,¹³ was in lower side, that is, 2.36%, while, in modern world, the transmission through blood transfusion is nearly eliminated due to routine screening of blood donations.^{14,15}

Limitations of the study

The clients during the pre-counseling sessions were inquired about the sensitive topics and personal information. Thus, there is likelihood that at few instances, the information provided is biased, erroneous or fragmentary due to social stigma or faulty memory. Record of HIV in the family is sometimes not mentioned due to the fear of blot on one's name.

CONCLUSION

The main mode of HIV transmission in our study is by heterosexual transmission. Our study shows highest number of HIV in sexually active age group especially in male population. High prevalence of HIV was seen in uneducated, married people of either sex. Overall males were 1.5 times more seropositives as compared to females. Knowing these facts in study population government should establish more ICTC centers and masses should be educated and made conscious about HIV transmission. Females should be encouraged to attend ICTC in sexually active group even in minor suspicion. Well timed confirmation of HIV positivity in suspected individuals will help them in receiving ART treatment and to prevent the further transmission of the disease.

ACKNOWLEDGMENT

We thank all the individuals included in this study. We are also thankful to all the staff working in the state reference laboratory for their sincere cooperation.

REFERENCES

1. Solomon S, Solomon SS and Ganesh AK. AIDS in India. *Postgrad Med J.* 2006;82(971):545-547. <https://doi.org/10.1136/pgmj.2006.044966>
2. Deeks SG, Overbaugh J, Phillips A and Buchbinder S. HIV infection. *Nat Rev Dis Primers.* 2015;1:15035. <https://doi.org/10.1038/nrdp.2015.35>
3. Simoes EA, Babu PG, John TJ, Nirmala S, Solomon S,

- Lakshminarayana CS, et al. Evidence for HTLV-III infection in prostitutes in Tamil Nadu (India). *Indian J Med Res.* 1987;85: 335-338.
4. Luciw PA. Human immunodeficiency viruses and their replication. In: Fields BN, editor. *Virology*. 3rd ed. Philadelphia, PA: Lippincott-Raven; 1996. p. 1881-1952.
 5. Pandey D, Chouhan U and Verma N. HIV infection: A review of their inhibitors progression. *Biomed Pharmacol J.* 2017;10(2):749-758.
<https://doi.org/10.13005/bpj/1164>
 6. Nayak RK, Kulkarni RD and Ajantha GS. Trend of clients attending an integrated counselling and testing centre of a tertiary care hospital in North Karnataka: A record based study. *Int J Community Med Public Health.* 2019;6(7):2977-2981.
<https://doi.org/10.18203/2394-6040.ijcmph20192837>
 7. Ramachandran R, Chandrasekaran V, Muniyandi M, Jaggarajamma K, Bagchi A, and Sahu S. Prevalence and risk factors of HIV infection attending ICTCs in six districts of Tamilnadu, South India. *AIDS Res Treat.* 2011;2011:650321.
<https://doi.org/10.1155/2011/650321>
 8. Hazarika NK, Alam ST, Sarmah A and Bhagawati A. A retrospective study on the prevalence of HIV among patients attending a tertiary care hospital of Northeast India. *World J AIDS.* 2016;6(2):65-73.
<https://doi.org/10.4236/wja.2016.62010>
 9. Dandona L, Dandona R, Kumar A, Reddy B, Ameer A, Ahmed M, et al. Risk factors associated with HIV in a population-based study in Andhra Pradesh state of India. *Int J Epidemiol.* 2008;37(6):1274-1286.
<https://doi.org/10.1093/ije/dyn161>
 10. Madkar SS, Nilekar SL and Vankudre AJ. Prevalence of HIV infection among persons attending integrated counseling and testing centre, Ambajogai. *Natl J Community Med.* 2011;2(2):213-215.
<https://doi.org/10.1093/ije/dyn161>
 11. Singh A. HIV prevalence in suspects attending Sir Sunder Lal hospital. *Asian Pac J Trop Biomed.* 2011;1(1):69-73.
[https://doi.org/10.1016/S2221-1691\(11\)60071-3](https://doi.org/10.1016/S2221-1691(11)60071-3)
 12. Vyas N, Hooja S, Sinha P, Mathur A, Singhal A and Vyas L. Prevalence of HIV/AIDS and prediction of future trends in North-west region of India: A six-year ICTC-based study. *Indian J Community Med.* 2009;34(3):212-217.
<https://doi.org/10.4103/0970-0218.55286>
 13. Sundar L. Surveillance of HIV/AIDS in India (editorial). *Indian J Community Med.* 2003;28(1):3-9.
 14. Joardar GK, Sarkar A, Chatterjee C, Bhattacharya RN, Sarkar S and Banerjee P. Profiles of attendees in the voluntary counseling and testing center of North Bengal medical college in Darjeeling district of West Bengal. *Indian J Community Med.* 2006;31(4):43-46.
 15. Gayle HD and Hill GL. Global impact of human immunodeficiency virus and AIDS. *Clin Microbiol Rev.* 2001;14(2):327-335.
<https://doi.org/10.1128/CMR.14.2.327-335.2001>

Authors Contribution:

A- Concept and design of the study, prepared first draft of manuscript; **AA-** Interpreted the results; reviewed the literature and manuscript preparation; **AS-** Concept, coordination and interpretation, preparation of manuscript and revision of the manuscript; **NC-** Concept and design of the study; **PS-** Statistical analysis; **SK-** Interpreted the results, reviewed the literature and revision of the manuscript.

Work attributed to:

Sarojini Naidu Medical College, Agra - 282 002, Uttar Pradesh, India.

Orcid ID:

Dr. Astha - <https://orcid.org/0000-0003-3721-7089>
 Dr. Arti Agrawal - <https://orcid.org/0000-0002-0983-4189>
 Dr. Ankita Soni - <https://orcid.org/0000-0002-4472-4030>
 Dr. Neetu Chauhan - <https://orcid.org/0000-0003-4571-0340>
 Dr. Priyanka Sahu - <https://orcid.org/0000-0003-2600-562X>
 Dr. Sanjeev Kumar - <https://orcid.org/0000-0001-5558-809X>

Source of Funding: Nil, **Conflicts of Interest:** None declared.