

Trend of HIV Infection and Associated Risk Factors at Integrated Counselling and Testing Centre in a Tertiary Care Hospital in Bihar: A Retrospective Study

VIDYUT PRAKASH¹, NIDHI PRASAD², SK SHAHI³

ABSTRACT

Introduction: Human Immunodeficiency Virus (HIV) infection became a major global health issue and a priority in many countries because it is the leading cause of morbidity and mortality throughout the world. In India, about 71% of total annual new HIV infections were reported from Telangana, Bihar, West Bengal, Uttar Pradesh, Andhra Pradesh, Maharashtra, Karnataka, Gujrat, Tamil Nadu and Delhi. The major cause of concern is that around 25% of the infected people are not aware that they are infected by HIV virus and is one of the major risk factor responsible for the spread of HIV infection.

Aim: To evaluate the trends, pattern and associated risk factors responsible for the spread of Human Immunodeficiency Virus (HIV) infection in patients who attended Integrated Counselling and Testing Centre (ICTC) of a tertiary care centre of Bihar, India.

Materials and Methods: A retrospective study was conducted on the available records of all the patients who attended ICTC of a tertiary care centre in Bihar, India, between January 2016 to December 2018. The data regarding the age, sex, marital status, educational status and behavioural pattern of the

patients tested for HIV infection at the ICTC were assessed and analysed. Descriptive statistical analysis was done.

Results: The total of 16333 and 15969 patients received counselling and testing services respectively during the study period. The prevalence of HIV infection was 3.70%, amongst whom 64.38% were males and 32.93% were females including 2.69% pregnant female patients. The ratio of seropositive male to seropositive female was 2.07:1. Maximum seroreactivity was found in 35-49 years age group (38.57%) followed by 25-34 years age group (28.42%). The major factor for the transmission and spread of HIV infection was unprotected sexual contact (88.33%) followed by mother to child transmission, infected blood and its products and infected needles and syringes. Illiteracy (45%) and unawareness was the major associated factor for spread of HIV infection.

Conclusion: The high prevalence of HIV infection can be minimised by creating awareness, following safe sexual practices, promoting antenatal screening, procuring blood and its product from authorised blood banks where proper screening of Transfusion Transmitted Infections (TTI) is done.

Keywords: Antenatal screening, Blood donation, Human immunodeficiency virus, Prevalence, Sexual behaviour

INTRODUCTION

The HIV infection became a major global health issue and a priority in many countries because it is the leading cause of morbidity and mortality throughout the world. In 2017, an estimated 36.9 million people were living with HIV/AIDS (PLWHA), including 1.8 million children, with a global prevalence around 0.8% among adults. Till the year 2018, around 76.1 million people have become infected and 35.0 million people have died of Acquired Immuno Deficiency Syndrome (AIDS) related illnesses [1]. The major cause of concern is that around 25% of these infected people are not aware that they are infected by HIV virus [2]. India has the third-largest HIV epidemic in the world. In 2017, 88,000 people in India were newly infected with HIV. Majority of them were men (50,000) followed by women (34,000) and around 3,700 among children below 14 years of age [3]. Annually, 71% of total new HIV infections reported from Tamil Nadu, West Bengal, Telangana, Gujrat, Bihar, Karnataka, Uttar Pradesh, Andhra Pradesh, Delhi and Maharashtra [4].

National AIDS Control Organisation (NACO) is responsible for formulating policy and implementing programs for prevention and control of the HIV infection in India, in which ICTC plays a major role [5]. An ICTC is a place where a person can get counselling and testing for HIV, as advised by a medical service provider or even on voluntary basis. It is not in ICTC's mandate to counsel

and test everyone in the general population. The main functions of an ICTC include performing HIV diagnostic tests, imparting basic information regarding the modes of HIV transmission, and ways to reduce vulnerability by promoting behavioural change. Moreover, it also links people with other HIV services for its prevention, care and treatment. Besides these, the data generated in ICTC provide important clues to understand epidemiology of disease in a particular region [6,7].

As per the NACO 2017 reports, national HIV prevalence in India among adults were found to be 0.22% (0.16-0.30) with 0.25% (0.18-0.34) among men and 0.19 (0.14-0.25) among women. In India, the prevalence of HIV was diminishing persistently from 0.38% in 2001-2003 to 0.34%, 0.28%, 0.26% 0.22% in 2007, 2012, 2015 and 2017, respectively [4].

Regarding the HIV prevalence among the States/Union Territory (UT) in 2017, the highest prevalence of 2.04% (1.57-2.56) were present in Mizoram followed by 1.43% (1.17-1.75) in Manipur, 1.15% (0.92-1.41) in Nagaland 0.70% (0.50-0.95) in Telangana and 0.63% (0.47-0.85) in Andhra Pradesh.

The other states with greater HIV prevalence than the national prevalence (0.22%) were Karnataka 0.47%, (0.37-0.63), Goa 0.42%, (0.21-0.79), Maharashtra 0.33%, (0.25-0.45) and Delhi (0.30%, 0.18-0.47). Tamil Nadu 0.22%, (0.14-0.31) had point prevalence

equal to the national average. All other States/UTs had reported adult HIV prevalence below 0.22% [4].

Limited information is available about the trend of HIV infection and associated risk factors for the spread of HIV infection in Bihar, India [8]. Thus, this study was undertaken to determine the seroprevalence, of HIV infection in the patients who attended the ICTC of tertiary care centre in Bihar and to evaluate the trends, pattern and associated risk factors including age, sex, marital status, educational status and behavioural in all seropositive cases.

MATERIALS AND METHODS

A retrospective study was conducted in duration of three months from May 2019 to July 2019, after ethical clearance as per letter number 869/IEC/2019/IGIMS dated 26.4.2019, on the available records of all the patients who attended ICTC of IGIMS, Patna, a Tertiary Care Centre in Bihar, between January 2016 to December 2018. Data of all patients who attended the ICTC centre of IGIMS during the study period was included and previously diagnosed HIV patients earlier at this ICTC were excluded from the study. The counsellors had provided pre-test and post-test counselling to the patients and had collected the anonymous and unlinked data in registers and logbooks as per NACO guidelines [5], under strict confidentiality, after taking informed consent of the patients. During counselling procedure audio-visual privacy, confidentiality, comfort and ease of individuals were taken care of. Each individual was counselled separately in clear and simple understandable language. In pre-test counselling, counsellor provides information about HIV and AIDS, window period, mode of transmission, prevention message, care, support and available treatment services. Explain the benefits of HIV testing, right to opt out of HIV testing, assure the confidentiality about shared information and test result. Counsellor also provides information on genital, menstrual and sexual hygiene, demonstrate how to use condom, encourage testing of their spouse/sexual partner. Post-test counselling was done irrespective of the result of HIV test. It helps individuals to understand and cope up with the HIV test result. Post-test counselling was divided in three groups depending upon test result: (i) individuals found positive for HIV; (ii) individuals with HIV indeterminate result; (iii) individuals found negative for HIV. The anonymous information's were documented [7].

HIV (1 and 2) antibody testing were done in those patients who gave written consent using rapid kits and were reported according to the NACO guidelines strategy III [8]. Antibodies to HIV were tested initially with a "CombAids- RS, HIV 1+2 immunodot test kit" (Arkray Healthcare Pvt., Ltd.). The samples testing positive by the first kit were subjected to tests with two different rapid tests, i.e., MERISCREEN HIV 1-2 WB rapid test (Meril Diagnostic) and Signal

HIV Flow through HIV 1+2 Spot/Immunodot Test (Arkray Healthcare Pvt., Ltd.). All tests were done according to the manufacturer's instructions. The samples were considered as positive when found reactive by all the three kits based on different test principle and/or methods according to the NACO guidelines strategy III [5]. Strict external quality assurance program was followed with State Reference Laboratory (SRL) where quarterly samples were sent and samples were received twice in a year from SRL that were processed and reported as per the NACO guideline [9]. HIV infected persons were referred to Antiretroviral Therapy (ART) centre for further management.

Data Collection

The data regarding the age, sex, marital status, educational status and behavioural pattern of the individuals tested were collected from ICTC of Indira Gandhi Institute of Medical Sciences. Year wise available data was compiled in Microsoft Excel sheet, each variable was checked for completeness. In this study, socio-demographic and behavioural characteristics of seroreactive HIV patients were also explored. Percentage of patient's seroreactive for HIV infection were calculated by simple proportion method, in which numerator was number of seroreactive HIV patients and denominator was total number of patients tested for HIV infection.

STATISTICAL ANALYSIS

Descriptive statistical analysis was done. All the data was entered in the Microsoft Excel sheet and the percentages were calculated.

RESULTS

Total patients who received counselling and testing services at this ICTC centre during 2016-2018 were 16333 and 15969, respectively. Among HIV screened patients, 10,280 (64.38%) were males, 5,259 (32.93%) were females and 430 (2.69%) were pregnant females. Among all {5,689= (5,259+430)} screened females, pregnant females were 8.17% (430/5,259×100). Out of 15969 tested individuals, 591 (3.70%) were positive for HIV infection. Percentage of HIV infection seroreactivity were 3.88% (399/10,280×100), 3.59% (189/5,259×100) and 0.69% (03/430×100) for males, females and pregnant females, respectively [Table/Fig-1]. Among 591 seropositive patients 399 (67.51%) were males, 189 (31.98%) were females and 03 (0.51%) were pregnant females. On analysing the available data of 591 seropositive patients from 2016 to 2018, it was found that maximum 228 (38.57%) patients belonged to 35-49 years age group followed by 168 (28.42%) in 25-34 years, 112 (18.96%) in >50 years, 60 (10.15%) in 15-24 years and 23 (3.9%) in <14 years [Table/Fig-2]. Among 591 seropositive patients from 2016 to 2018, 351 (59.4%)

Year	Counselling				Testing				Reactive			
	Male	Female	Pregnant	Total	Male	Female	Pregnant	Total	Male	Female	Pregnant	Total
2018	4268	2412	253	6933	4186	2327	252	6765	125	57	01	183 (2.70%)
2017	3187	1634	124	4945	3128	1590	124	4842	141	73	02	216 (4.46%)
2016	3036	1365	54	4455	2966	1342	54	4362	133	59	00	192 (4.40%)
Total	10,491	5411	431	16333	10280	5259	430	15969	399 (3.88 %)	189 (3.59 %)	03 (0.69 %)	591 (3.70%)

[Table/Fig-1]: Distribution of patients counselled, tested and diagnosed seroreactive for HIV infection (2016 to 2018).

Year	<14 Year		15-24 year		25-34 year		35-49 year		>50 year	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
2018	7	3	11	9	30	18	54	20	23	8
2017	5	4	18	11	40	26	48	25	30	9
2016	2	2	7	4	36	18	50	31	37	5
Total	14	9	36	24	106	62	152	76	90	22
	23 (3.9%)		60 (10.15%)		168 (28.42%)		228 (38.57%)		112 (18.96%)	

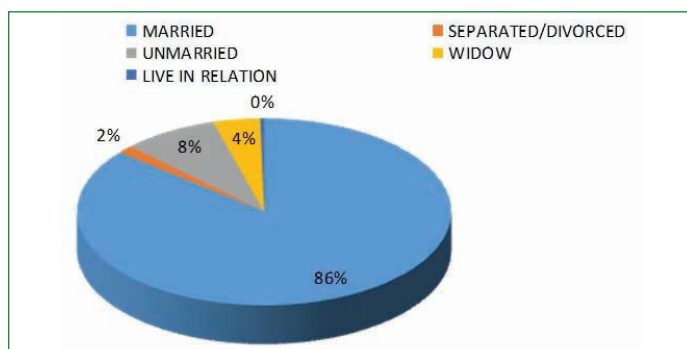
[Table/Fig-2]: Age wise distribution of 591 HIV seroreactive patients (2016 to 2018).

had history of sex with commercial sex workers, 170 (28.77%) had history of sex with their respective spouses only and 1 (0.16%) was homosexual. On further analysis of data, 22 (3.73%) got infection from mother, 4 (0.67%) through blood and its product, 2 (0.33%) through infected needle and syringes. In 41 (6.94%), the mode of transmission couldn't be ascertained [Table/Fig-3]. Regarding the social status of 591 seropositive patients, 508 were married, 49 were unmarried, 24 were widow and 10 were separated and divorced [Table/Fig-4]. As far as educational status of 591 seropositive patients was analysed, 266 were illiterate, 142 had education up to secondary school, 106 up to preschool and 77 were educated up to higher secondary level or above [Table/Fig-5].

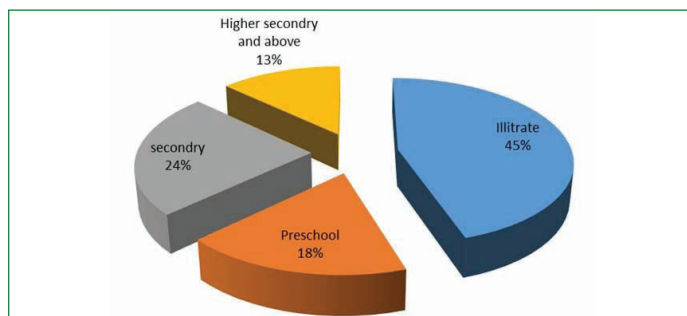
Year	Heterosexual				Homosexual/ Bisexual		Parent to child		Blood and its products		Infected needle/ Syringes		Unknown/ Nonspecific	
	Commercial partner		Spouse partner		M	F	M	F	M	F	M	F	M	F
	M	F	M	F										
2018	95+2*	02*	05	48	01	00	07	03	00	00	01	00	14	05
2017	123	00	00	61	00	00	05	04	02	01	00	00	11	09
2016	129	00	00	56	00	00	03	00	00	01	00	01	01	01
Total	349	02	05	165	01	00	15	07	02	02	01	01	26	15
	351 (59.4%)		170 (28.77%)		01 (0.16%)		22 (3.73%)		04 (0.67%)		02 (0.33%)		41 (6.94%)	

[Table/Fig-3]: Pattern of risk behaviour and probable source of transmission among 591 HIV seroreactive patients (2016 to 2018).

*Non regular partner



[Table/Fig-4]: Social Status of HIV seroreactive patients (2016-2018).



[Table/Fig-5]: Educational status of 591 HIV seropositive patients (2016-2018).

DISCUSSION

At present, the vaccine to prevent HIV infection is not available. Moreover, there is no effective and permanent cure of HIV infection, and thus, the only way to improve the quality of life as well as the life expectancy, and to prevent the spread of HIV infection, is through identifying the suspect client or population, followed by counselling and testing to find infected cases and timely initiation of appropriate ART to suppress the replication of virus in the that individuals. Since, the prevalence of HIV infection and the risk factors for the transmission and spread of HIV infection may vary from one region to the other depending on various factors. In the present study, authors decided to do a retrospective analysis by reviewing the available records of all the patients who attended ICTC of a Tertiary Care Centre in Bihar, between January 2016 and December 2018. During this period, 16333 patients received counselling and 15969 patients were tested. However, a remarkable increase was seen

in the patients attending the ICTC over time. The increasing trend included 4455 to 6933 patients being counselled and 4362 to 6765 patients being tested from 2016 to 2018. This may be due to increasing awareness about the availability of ICTC, HIV testing facility and referral to the centre for counselling and testing of suspected patients.

It was found that the prevalence of HIV infection at the ICTC centre of Indira Gandhi Institute of Medical Sciences, Patna a Tertiary Care Centre in Patna, Bihar was 3.70% during the three years period and it varied from 2.70% to 4.46% within this duration which was much greater than national HIV prevalence of 0.22% (0.16-0.30)

estimated in 2017 [4]. The higher prevalence was explained by the individuals attending ICTC were referred mostly from clinicians and also from some other nearby laboratories for confirmation of results. Among 591 HIV seroreactive patients 399 (67.51%) were males and 189 (31.97 %) were females which is accordance with studies done by Gupta V et al., and Madkar SS et al., [10,11]. Gupta V et al., reported seroreactivity for HIV infection were 78.48% in males and 21.52% in females [10] whereas Madkar SS et al., reported 75.58% males and 24.41% females were positive for HIV infection [11].

In the present study, prevalence among male and female individuals were much higher than the National HIV prevalence of 0.25% (0.18-0.34) among males and 0.19% (0.14-0.25) among females. This could be due to the fact that many patients found to be positive in routine screening tests are also referred to ICTC centre for confirmation and follow-up management [4].

Maximum seroreactive patients (38.57%) belonged to 35-49 years of age group followed by 28.42% in 25-34 years, which was in accordance with results reported in study by Kommula VM et al., done at ICTC of Andhra Pradesh, India [12].

High seroreactivity could be due to greater sexual activity in these age groups. The most common mode of HIV transmission was the unprotected heterosexual contact. Most of the heterosexuals seropositive patients had history of sex with commercial sex workers followed by history of sex with their respective spouses. It indicates that promiscuous sexual behaviour is the major risk factor for the spread of HIV infection. Other less common mode of transmission observed in this study was parent to child transmission, through transfusion of blood/blood products and needle stick injury. These results are nearly similar to results other studies done by Gupta V et al., Madkar SS et al., and Paranjape RS et al., [10,11,13].

Parent to child transmission of HIV infection can be prevented by proper antenatal screening and implementation of proper management guidelines for both seropositive mother and her baby. Indian Government started Prevention of Parent to Child Transmission of HIV/AIDS (PPTCT) programme in 2002. As of 2017, there were more than 23,400 sites offering PPTCT services [14]. Based on 2013 WHO Guidelines, the programme initiates antiretroviral treatment for all pregnant and breastfeeding women living with HIV regardless of CD4 count or stage of HIV infection [15]. In 2017, 60% of pregnant women living with HIV received PPTCT services, a 20% increase on 2016 levels [16].

A Transfusion Transmitted Infection (TTI) can be prevented by proper screening of blood and its products after donation. Transmission of HIV infection through infected needle and syringes can be minimised if standard precautions are taken to prevent needle stick injuries [17,18].

In 41 (6.94%), the mode of transmission could not be ascertained and thus more studies are needed to find out other probable modes of transmission. This is mostly depends on the skills and behavioural pattern of counsellors working in ICTC centre so that the patients feel comfortable in disclosing such facts or history in front of them.

In this study, it was found that about 86% of seropositive patients were married, which suggest that sexual behaviour with an HIV infected partner is the greatest risk factor for spread of HIV infection. As far as the educational status was concerned, 266 (45%) were illiterate and 142 (24%) had education up to secondary school suggesting that illiteracy, unawareness regarding risk factors, modes of transmission and ways to prevent may be important factors for the spread of HIV infection. The current study provides baseline information so that steps can be taken by the Government to minimise the preventable risk factors to control spread of HIV. This will provide useful information regarding the success or failure of Government Programs for controlling the HIV epidemic in this region so that appropriate steps can be taken to correct the existing lacunae.

Limitation(s)

There were several limitations in the study. The study was based on records of ICTC of a tertiary care centre in Bihar, India. Molecular testing of all seropositive patients could not be done due to lack of facility. Follow-up of seropositive cases and their response to ART was not analysed. Regional variation inside the state could not be assessed.

CONCLUSION(S)

The prevalence of HIV infection in this part of eastern India was 3.70% with maximum seroreactivity seen in age group of 35-49 years. Unprotected sexual contact was the major risk factor with illiteracy and unawareness being the major hurdles. This study indicated that steps should be taken to address the risk factors, including illiteracy and unawareness, to limit the spread of HIV infection in eastern India. This can be achieved by creating awareness regarding safe sexual practices, promoting proper antenatal screening and implementation of proper management guidelines for both seropositive mother and her baby, procuring blood and its product from authorised blood banks where proper screening of TTI is done and by following standard precautions to prevent needle stick injuries.

Acknowledgement

We acknowledge all the staff members of IGIMS ICTC centre for the proper documentation of patient's information, performing tests and for their technical support during data collection.

REFERENCES

- [1] Joint United Nations Programme on HIV/AIDS (UNAIDS). UNAIDS Data 2017. https://www.unaids.org/en/resources/documents/2017/2017_data_book.
- [2] Global HIV & AIDS statistics-2019 fact sheet UNAIDS <https://www.unaids.org/en/resources/fact-sheet>.
- [3] Global information and education on HIV and AIDS, HIV and AIDS in India | AVERT <https://www.avert.org/professionals/hiv-around-world/asia-pacific/india>.
- [4] HIV Facts & Figures : Adult HIV Prevalence in India during 1990 to 2017, HIV Estimations 2017 <http://naco.gov.in/hiv-facts-figures>.
- [5] National AIDS Control Organisation, Ministry of Health and family welfare, Government of India. Operational Guidelines for Integrated Counselling and Testing Centres July 2007. [http://upsacs.in/pdf/ICTC/Operational Guidelines for Integrated Counselling and Testing_2.pdf](http://upsacs.in/pdf/ICTC/Operational%20Guidelines%20for%20Integrated%20Counselling%20and%20Testing_2.pdf).
- [6] Together we will end AIDS. Joint United Nation Programme on HIV/AIDS (UNAIDS). 2012. http://files.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2012/JC2296_UNAIDS_TogetherReport_2012_en.pdf.
- [7] National AIDS Control Organisation, Ministry of Health and family welfare, Government of India. NATIONAL HIV COUNSELLING AND TESTING SERVICES (HCTS) GUIDELINES December 2016. [http://naco.gov.in/sites/default/files/National HIV Counselling & Testing Services Guideline, Dec2016_0.pdf](http://naco.gov.in/sites/default/files/National%20HIV%20Counselling%20and%20Testing%20Services%20Guideline%20Dec2016_0.pdf).
- [8] Ranjan A, Bhatnagar T, Babu GR, Detels R. Sexual behaviour, HIV prevalence and awareness among wives of migrant workers: results from cross-sectional survey in rural north India. *Indian J Community Med.* 2017;42(1):24-29.
- [9] National AIDS Control Organisation, Ministry of Health and family welfare, Government of India. Operational Guidelines for HIV Sentinel Surveillance October 2007, Under Laboratory Procedures at HIV Testing Laboratory. [http://naco.gov.in/sites/default/files/Operational Guidelines for HIV Sentinel Surveillance Round 2007_1.pdf](http://naco.gov.in/sites/default/files/Operational%20Guidelines%20for%20HIV%20Sentinel%20Surveillance%20Round%202007_1.pdf).
- [10] Gupta V, Singla N, Lehl SS, Chander J. Clinicoepidemiological profile of HIV infection over a period of six years in a North Indian tertiary care hospital. *Indian J Med Microbiol.* 2007;25:171.
- [11] Madkar SS, Nilekar SL, Vankudre AJ. Prevalence of HIV infection among persons attending integrated counseling and testing centre, Ambajogai. *Nat J Comm Med.* 2011;2(2):213-15.
- [12] Kommula VM, Mishra AK, Kusneniwar GN, Chappa SN, Raghava Rao KV. Profile of HIV positive clients in an ICTC of a private medical college, Andhra Pradesh: A situational analysis. *NJIRM.* 2012;3(2):36-40.
- [13] Paranjape RS, Challacombe SJ. HIV/AIDS in India: An overview of the Indian epidemic. *Oral Dis.* 2016;22 Suppl 1:10-14.
- [14] National AIDS Control Organisation, Ministry of Health and family welfare, Government of India. National Guidelines for HIV Testing July 2015. Chapter 5 National Strategies and Algorithms for HIV Testing. http://www.naco.gov.in/sites/default/files/National_Guidelines_for_HIV_Testing_21Apr2016.pdf.
- [15] National AIDS Control Organisation, Ministry of Health and family welfare, Government of India. Annual Report 2015-2016 http://naco.gov.in/sites/default/files/Annual%20Report%202015-16_NACO.pdf.
- [16] Joint United Nations Programme on HIV/AIDS (UNAIDS) 'AIDS info' (accessed September 2018) <https://www.unaids.org/en/resources/documents/2018/unaids-data-2018>.
- [17] WHO Aide-memoir: Standard Infection control precautions in health care. WHO, available at: <http://www.who.int/csr/resources/publications/standardprecautions/en/index.html>.
- [18] WHO, HIV Technical Briefs, Prevention of HIV Transmission in Health Care Settings (updated on May 2007) <https://www.who.int/hiv/pub/toolkits/HIV-transmission-in-health-care-settings.pdf>.

PARTICULARS OF CONTRIBUTORS:

1. Senior Resident, Department of Virology, IGIMS, Patna, Bihar, India.
2. Assistant Professor, Department of Virology, IGIMS, Patna, Bihar, India.
3. Professor and Head, Department of Microbiology, IGIMS, Patna, Bihar, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Nidhi Prasad,
Assistant Professor, Department of Virology, IGIMS, Patna-800014, Bihar, India.
E-mail: prasadnidhi72@gmail.com

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

PLAGIARISM CHECKING METHODS: (Jan H et al.)

- Plagiarism X-checker: Jan 11, 2020
- Manual Googling: Dec 12, 2020
- iThenticate Software: Jan 12, 2021 (19%)

ETYMOLOGY: Author Origin

Date of Submission: **Jan 07, 2020**
Date of Peer Review: **Feb 20, 2020**
Date of Acceptance: **Dec 11, 2020**
Date of Publishing: **Apr 01, 2021**