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ORIGINAL PAPER

CO-INFECTIONS IN THE BLOOD DONORS: A STUDY FROM PEOPLE MIGRATED OF DAHOD TRIBAL DISTRICT AND COMING BACK TO DAHOD OF THE EASTERN PART OF GUJARAT.

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ABSTRACT

Introduction –

Dahod district in Gujrat is an entirely Tribal and backward populated area. The total population of the district is 21,20,000. Most of the population always migrates to developed areas of the country in search of jobs and work. This study Targeted people who migrated from the Dahod Tribal district and returned to Dahod in eastern Gujarat. Blood transfusion is a treatment and has proven lifesaving in millions of lives. Unsafe blood transfusion is one of the transmission methods for infectious agents. Therefore, this study aimed to assess the seroprevalence of co-infection of transfusion-transmitted infections in these migrated blood donors.

Methods and observations- This is a retrospective cross-sectional study used to find the prevalence of co-infections in blood donors using data collected from the last year. Screening of HIV, HBV, and HCV was done by using the Enzyme-Linked Immunosorbent Assay (ELISA Test for Syphilis was done by immunochromatography. P value < 0.05 was considered statistically significant. A total of 8996 blood donors from the last one-year period were included in the study. The total number of seropositive blood donors was 413 and migrated seropositive donors were 298. Total Mono infected Donors were 398(4.42%) and co-infected donors were 15 (0.16%). Among co-infection, HIV+VDRL constitutes the predominant

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category consisting of 06 donors, followed by HBV+VDRL 04, HBV+HCV 03, and HIV+VDRL and HCV+VDRL 01 each.

Conclusion - From our study data we found that co-infections are more common among migrant donors which could be due to high-risk behavior. The promotion of voluntary donors would reduce the risk of TTIs. All transfusion-transmitted infections are likely transmitted through a sexual route. Hence, strict donor screening and testing criteria are strongly recommended. Further research is needed to determine whether early treatment of syphilis in HIV/syphilis co-infected patients would be associated with improved responses to ART and better clinical outcomes.

Keywords-

Co-infection, TTIs, Blood donors, Migrated, Tribal.

INTRODUCTION –

This study was conducted at Zydus Medical College and Hospital Blood Center Dahod, which is in the headquarters of the Dahod District in the eastern part of Gujarat state in India. Dahod district is a tribal and backward populated area. The total population of the district is 21,20,000, Majority of the population always migrates to other developed areas of the whole country in search of jobs and work. They always come back for marriages, festivals, and for the cultivation of crops. Transfusion-transmitted infection from the blood donor must be Investigated very carefully to avoid blood transfusion infection in the Patients. The most common infections are HIV, HBV, HCV, SYPHILIS & Malaria, in which HIV, HBV, HCV & SYPHILIS are sexually transmitted Diseases, these infections may be co-infected with each other. This study was targeted at people who migrated from the Dahod Tribal district and came back to Dahod in eastern Gujarat.

Transfusion transmissible infections (TTIs) in blood donors present as a global public health problem. Hepatitis B virus (HBV), hepatitis Human immunodeficiency virus (HIV), hepatitis C virus (HCV), and Treponema pallidum coinfection have emerged as a leading cause of morbidity throughout the world in the last two decades.[1,2] With every unit of blood, there is a 1% chance of TTIs. Because of shared modes of transmission, co-infection with HIV, HBV, VDRL, and HCV is a significant occurrence, particularly in areas where these viruses are endemic and even amongst healthy subjects like blood donors. WHO recommends an integrated strategy to improve blood transfusion safety by establishing well-organized blood

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transfusion services, blood collection from voluntary non-remunerated donors, screening of blood for at least four major TTIs with quality assured system, and rational use of blood.[3] As per National AIDS Control Organization (NACO), 3.5% of HIV infection is attributed to blood transfusion.[4] Although there are many studies on the Prevalence of TTIs in blood donors, data on the presence of co-infection with more than one TTI is sparse.[5,6] HIV, HBV, HCV, SYPHILIS & Malaria are the main infections that are transmitted through blood during blood transfusion. This study was undertaken to analyse the prevalence and Patterns of co-infections among migrated, non-migrated donors in tribal geographical area.

MATERIAL AND METHOD -

This is a retrospective cross-sectional study conducted at Zydus Medical College and Hospital Blood Center Dahod in 5653 migrated blood donors from Dahod tribal District in the eastern part of Gujarat in the last year. Informed consent was taken from each blood donor at the time of blood donation. All donors were tested for Anti – HIV I and II, HBV, anti–HBC IgM, anti–HCV, Malaria, and SYPHILIS. All reactive donor samples were confirmed by using Confirmatory assays. Donors were grouped as mono-infected and co-infected donors.

Inclusion criteria: Any donor meeting all criteria for eligibility of blood donation as mentioned in the Standard Operating Procedures (SOP) of Blood Bank, Zydus Medical College, and Hospital Dahod.

Exclusion criteria: Any eligible donor having any reaction during the blood donation procedure was excluded from the study.

Donor's serum separated from a plain vacutainer was used for serological analysis. Two ml of blood sample was collected in labelled pilot tube at the time of collection of the blood from donor tubing of blood bag. The sample was centrifuged at 3500 rpm for 5 minutes to obtain clear nonhemolytic serum. The samples were tested for HIV, HBV, HCV, Malaria and Syphilis. Screening test for HIV was done by rapid test – HIV-immunochromatography. (Manufactured by – ERBA DIAGNOSTICS, India) and confirmed by MICROLISA- HIV Ag–Ab Elisa kit (QUALISA Co. PVT. LTD. New Delhi, India.) and CLIA METHOD (ORTHO

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DIAGNOSTICS INDIA). Screening Test for Hepatitis B was done by immunochromatography (manufactured by – ERBA DIAGNOSTICS, India) confirmed by Elisa kit (QUALISA Co. PVT. LTD. New Delhi, India.) and by CLIA METHOD (ORTHO DIAGNOSTICS INDIA) HEPAELISA. Screening test for HCV was done by immunochromatography. (Manufactured by – ERBA DIAGNOSTICS, India), confirmed by MICROLISA- Elisa kit (QUALISA Co. PVT. LTD. New Delhi, India.) and by CLIA METHOD (ORTHO DIAGNOSTICS INDIA). Test for Malaria (MP) was done by slide method using Giemsa Stain and immunochromatography. (manufactured by – ERBA DIAGNOSTICS, India), which is a visual, rapid, and sensitive immunoassay for the qualitative diagnosis of infection with all four Plasmodium Species (P. falciparum/P. vivax/ P. malariae/P. ovale) in human whole blood. Test for Syphilis was done by immunochromatography. (manufactured by – ERBA DIAGNOSTICS, India), confirmed by MICROLISA- Elisa kit (QUALISA Co. PVT. LTD. New Delhi, India.) and by CLIA METHOD (ORTHO DIAGNOSTICS INDIA). All the serological tests on donor blood were carried out according to the instructions given by the manufacturer with positive and negative controls. Reactive sera were confirmed by repeat testing by another kit by a different manufacturer. Confidentiality of reports was maintained as per the standard guidelines. Internal and external quality controls were carried out as per protocol. The data from all test results were collected in an Excel datasheet and analysed. Ethical approval for this study was taken from the Institutional Ethics Committee Zydus Medical College and Hospital Dahod-389151(Gujrat) vide registration no. 108/ZMCH/3rd IEC Meeting/2024 dated 23/07 2024.

OBSERVATIONS & RESULT –

In the present study, out of 8996 total donors, 8450 were voluntary and 546 were replacement donors. Among the total 8996 donors7344 (81.63) % were males and 1652 (18.73 %) were females (Table-10).

Table 1. Distribution of Donors according to sex.

Total donors	Male	Female
8996	7344 (81.63%)	1652 (18.37%)

Among 8996 studied donors, 5653 were migrant donors (62.95%) from Dahod, and coming back to Dahod, local donors were 3343 (37.05%) In migrant and Nonmigrant donors male donor predominance was noted. (Table 2).

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Table 2. Distribution of Donors according to Migration.

Total donors	Migrant			Nonmigrant		
	Male	Female	Total	Male	Female	Total
8996	5329	324	5653 (62.95%)	2015	1328	3343 (37.05%)

Out of 8996 donors, 413 were seroreactive. Among these 298 (72.15%) were from migrant Donors and 115 (27.85%) from Nonmigrant Donors. Seropositivity is most common in male donors of migrant and non-migrant groups. (Table 3).

Table 3. Prevalence seropositivity among Migrant and Nonmigrant blood donors.

Total seroreactive donors	Migrant			Nonmigrant		
	Male	Female	Total	Male	Female	Total
413	292	06	298 (72.15%)	109	06	115 (27.85%)

In this study, the total number of mono-infected Donors was 398, and the Co-infected donors were 15 comprising all males. Seropositivity in these donors is shown in Table 4. In Migrated blood donors co-infection is in 15 donors while mono-infection is in 277 blood donors. (Table 4)

Table 4. Seroreactivity in Mono-infected and Co-infected Blood donors.

Total seroreactive donors	Mon infected Donors			Co-Infected Donors		
	Migrated	Non-Migrated	Total	Migrated	Non-Migrated	Total
413	277	121	398 (96.38%)	15	00	15 (3.62%)

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In this study, the seroprevalence of HIV was found to be 0.01%. Similar findings by Adhikary M et al, (0.1%) and Giri PA et al., (0.07%).[7,8] Lower prevalence was reported by Cheema S et al., (0.03%).[6] Other Indian studies by Bhutia CT et.al and Patil PU et al. show a higher prevalence of HIV compared to this study. (Table 7). In the study, the seroprevalence of HBV was 0.21% among the donors, similar to the findings by Adhikari M et al. (0.28%).[7] Higher occurrences than the present study were seen in many other Indian studies.[6,8,9,10,] Though there is an effective vaccine against HBV, the seroprevalence of HBsAg in India is high. This is because of a long window period between initial HBV infection and the detection of HBsAg.[11] The prevalence of Hepatitis C in the present study was 0.21 which is higher than many other Indian studies than in our study (Table 6). Hepatitis C is a blood-borne infection. In India, both HBV and HCV infections occur in varying numbers because of variations in geographical conditions and ethnicity.[12] The prevalence of syphilis in the present study was 0.02%, like findings by Bhutia CT and Das D and Cheema S et al.[9] The study showed a higher and lower prevalence of syphilis than many other Indian studies (Table 6). Syphilis is a sexually transmitted disease, which is likely to be associated with an increasing risk of HIV infection and hence increasing the risk of co-infection and morbidity.14 In this study, malaria cases were detected (0.04%), as the findings by Patil PU et.al et al., (0.01%). All other studies showed no malaria cases in their study.[7,8,9]

In our study 15 (0.16%) cases of co-infections were detected among all donors. The co-infections (HIV+VDRL, HBV+VDRL, HCV+VDRL, HIV+HCV, HBV+HCV), found in our study are a little higher than in other studies.[13] (Table 7, 8). Most of the co-infection in our study is with syphilis. Syphilis can increase the susceptibility to other sexually transmitted diseases. These infections share common modes of transmission and risk groups and are prone to the occurrence of coinfections. The tribal and migrant population in our area is a high-risk group for these co-infections. The newer diagnostic test such as the Nucleic Acid Testing (NAT) that can detect acute viral infections during the window period is another approach to improve the safety and quality of infection-free blood donation. Many blood centres not using this technique due to the high cost which is unaffordable for the blood centres in the present era.

Table 5. Seroprevalence of Transfusion-transmitted infections - age-wise distribution.

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Studies	HIV%	HBsAg%	HCV%	MP	Syphilis%
Bhutia CT and Das D (2019), Sikkim, India [9]	0.22	0.91	0.15	0	0.04
Patil PU et al., (2020), Maharashtra, India [10]	0.13	1.02	0.14	0.01	0.001
Adhikary M et al., (2021), Eastern India [7]	0.01	0.28	0.12	0	0.004
Cheema S et al., (2022), north India[6]	0.03	0.49	0.5	0	0.05
Nilam Hardik Patel et al, India (2023) [8]	0.08	0.52	0.14	0	1.32
Present study 2024	0.01	0.21	0.24	0.04	0.02

Age group (years)	HIV (%)	HBsAg (%)	HCV (%)	Malaria (%)	Syphilis (%)	Total (%)
18-30	4 (0.96)	87 (21.07)	99 (23.97)	0 (0.00)	9 (2.18)	199 (48.18)
31-40	3 (0.73)	85 (20.58)	83 (20.10)	1 (0.24)	6 (1.45)	178 (43.10)
41-50	2 (0.48)	16 (3.87)	11 (2.66)	3 (0.73)	3 (0.73)	35 (8.47)
>50	0 (0.00)	1 (0.24)	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.24)
Total	9	189	193	4	18	413

Table 6. Seroprevalence of Transfusion Transmissible Infections (TTIs) in various Studies.

Table 7. Seroprevalence of Type of Co-infection in Blood Donors

Type of Co-Infection	No.
Co-infection with HIV+VDRL	06

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Studies	C-infection case (%)
Makroo RN et al (2015) [14]	0.07%
Ashwin. P. Khageshan (2016)[15]	0.09 %
Chandekar SA et al (2017)[13]	0.07 %
Ravi c Dara et al (2017)[16]	0.05%
Sindhuja Kondareddy (2018)[17]	0.08%
Nilam Hardik Patel et a (2023)[18]	0.04 %
Present study 2024	0.16%
Co-infection with HIV+HCV	01
Co-infection with HIV+HBV	00
Co-infection with HBV+HCV	03
Co-infection with HBV+VDRL	04
Co-infection with HCV+VDRL	01
Total	15

Table 8. Seroprevalence of Co-Infections in Various Other Studies

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DISCUSSION-

The key purpose of blood centres is to deliver a safe, and effective supply of blood and blood components to the patients and they constitute an essential part of the health care system.7 As compared with the developed countries, the risk of TTIs due to blood transfusion remains significant in developing countries like India.[19] In India the basis of national blood policy is to collect blood donations only from voluntary blood donors and reject all paid donations. This will reduce TTI and help in supplying safe blood supply to the patients. Careful screening of all TTI and preventing blood transfusion in patients where it is not mandatory.[20]

In the current study, the co-infection rate among blood donors was studied for one year. 15/413 (3.62%) donors from all reactive donors were positive for two or more viral markers (co-infected). Our study shows that more prevalence of HIV, HBsAg, HCV, and VDRL infections in the migrated donors i.e. 298 from 5653 migrated donors and 115 from 3343 local donors.

Co-infection is seen in 15 Donors who migrated from Dahod Tribal district eastern part of Gujarat state and returned to the same district. Co-infection was seen in the male donors only. HIV With HBsAg co-infection was not observed in any of the donors. VDRL infection is the most common co-infection along with other infections. HIV with VDRL is the most common co-infection observed in our study. From the study findings, it is observed that to open wound surface in VDRL infection likely causes co-infection with other infections. Globally HIV, HBV, and HCV expected cases are 130 million, 370 million, and 40 million respectively. In HIV-infected persons, roughly 2–4 million have chronic HBV infection and 4-5 million have HCV coinfection. Syphilis points towards indulgence in high-risk behavior and therefore a higher risk of exposure to infections like HIV, HBV, and HCV.10 TTI's have a common mode of transmission including similar routes of transmission, risk factors, a high degree of epidemiological similarity and higher prevalence with other sexually transmitted diseases. These infections favour coinfection and are a great threat to safe blood donations.11 The prevalence of syphilis which presents as a major coinfection with HIV, HBV, and HCV in the present study was higher than in other Indian studies. Syphilis is a sexually transmitted disease,

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which is likely to be associated with an increasing risk of HIV infection and increasing risk of morbidity and mortality.[9.10 21,22] The prevalence of co-infection with HIV and syphilis varies from 8% to 25%, in different studies.25 Co-infection with syphilis could enhance HIV replication by increasing activation of host immune cells, altering the secretion of cytokines, including TNF-α, and upregulating transcription factors, such as nuclear factor kappa beta. Since ART became widely available, the evidence that undetectable HIV equals non-transmissible HIV has spread, and the prevalence of HIV/syphilis co-infection has been significantly increased by the reduced use of condoms.[23]

All infections in our study were likely to be transmitted through the sexual route, as the donors are in the reproductive age group, and due to the long sexual abstinence period, they might practice multiple sexual partners. Another common reason may be unsafe sexual practices among these blood donors, as the economic crisis led to stress and different behavioral changes among them. Few donors were detected who were in the window period at the time of blood donation. Strict measures must be taken for donor selection, especially considering their personal, family, and social conduct. Also treating doctors must be guided to implement rational use of blood transfusion.

CONCLUSION –

As per our knowledge research on the prevalence of co-infection in tribal areas is very limited. From our study data, we found that the migrant population was more prone to TTIs and co-infections. The study showed that TTIs were more seen in male migrated donors and showed a higher prevalence of syphilis as a co-infection with other STDs. So, it requires better post-donation donor counselling and efforts for case detection, treatment of these infections, and other preventive measures to control these infections. Strict donor selection criteria for blood donation must be applied and repeat screening considering window period for donors should be done. Blood is one of the main sources of transmission of TTIs. The availability of safe blood for transfusion is a must for the patients. Detailed donor screening and the use of highly sensitive tests for the detection of TTIs are highly suggested to safeguard the patients.

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