



ORIGINAL ARTICLE

## The annual prevalence of syphilis among blood donors of regional blood centers of Sindh: A study conducted by the Sindh blood transfusion authority to evaluate the infectious rate of syphilis among blood donors.

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**ABSTRACT... Objective:** To detect any possible illnesses, such as syphilis, and stop them from spreading through transfusion, screening blood donors is crucial. **Study Design:** Cross-sectional Retrospective Research study. **Setting:** Four RBCs and the sixteen associated hospital-based blood banks (HBBBs) that are spread over Sindh's various areas. **Period:** January 2022 to December 2022. **Methods:** Employing non-probability convenience sampling was carried out. We collected data from Sindh province's Regional Blood Centers (RBCs) and Hospital Based Blood Banks (HBBBs), dispersed throughout the province. Sindh Blood Transfusion Authority (SBTA)'s ethical committee approved the study. To screen selected blood donors for Syphilis, the Chemiluminescence Immunoassay Analyzer (CLIA) was used. Data from the study were summarized using simple percentages after they were statistically examined. **Results:** With 171,725 male donors and 1,460 female donors, men comprised the bulk of the 173,185 blood donors. Syphilis turned up in 2.5% of the male donors, resulting in an additional 4,311 cases. On the other hand, just 18 (1.2%) of the female donors had a positive syphilis test. The gender distribution of cases with positive Syphilis indicates a notable difference in its frequency between people of both sexes. The age group of 25 to 40 years old accounted for the largest proportion of syphilis cases among blood donors. **Conclusion:** One of Sindh's biggest public health concerns is the high incidence of syphilis among blood donors. Additionally, the results show that the incidence of syphilis varies by gender. Furthermore, there are considerable age range differences in the distribution of syphilis cases. These results highlight the need for increased screening and preventive programmes, especially in areas with higher incidence rates. Given the high frequency of syphilis among Sindhi red blood cell donors, this could point to a greater number of cases in the overall community.

**Key words:** Syphilis, CLIA, Frequency, Regional Blood Centres.

### INTRODUCTION

*Treponema pallidum* is the bacteria that causes syphilis, a sexually transmitted infection (STI). If not addressed promptly, it may result in significant long-term consequences. Blood tests such as the *Treponema pallidum* haemagglutinin assay and the rapid plasma reagin (RPR) are commonly used to diagnose syphilis. These assays can both confirm the diagnosis and detect antibodies to the syphilis bacteria. Antibiotics, most frequently penicillin, are the standard treatment for syphilis. The exact course of medication depends on the patient's medical history and the stage of infection. By using condoms and engaging in safe sexual

behavior, including mutual monogamy with a partner who has undergone testing and is not infected, this STI can be avoided.<sup>1</sup> The number of cases worldwide with syphilis increased by 60.83% from 30.91 million in 1990 to 49.71 million in 2019.<sup>2</sup> According to estimations from the World Health Organisation (WHO), 7.1 million individuals aged 15 to 49 contracted syphilis in 2020.<sup>3</sup> Among patients in need of blood, safe blood transfusion is a necessity given that they ensure that the blood they receive is free of transfusion-transmittable illnesses (TTI), which include infectious diseases such as HIV/AIDS, malaria, syphilis, hepatitis B, and hepatitis C.

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The key to stopping the spread of transfusion-transmittable illnesses is to screen blood donors for potential infections. Given the rising prevalence of this sexually transmitted disease, it is advised that people with syphilis diagnoses or those who participate in high-risk behaviors refrain from donating blood until they have completed treatment and proven negative for the infection. Moreover, blood donation facilities could advise donors to postpone giving blood for an indefinite period if they continue to engage in high-risk behaviors.<sup>4-6</sup>

## METHODS

Using data from Sindh province's regional blood centres (RBC's) through non-probability convenience sampling, a retrospective cross-sectional study was carried out between the months of January 2022 to December 2022. Data was gathered from four RBCs and the sixteen associated hospital-based blood banks (HBBBs) that are spread over Sindh's various areas. The study's methodology and moral consequences were accepted by the SBTA ethical board committee (SBTN/2647) (29-12-2023). The Chemiluminescence Immunoassay Analyzer (CLIA) was used to perform serological testing for Syphilis per the instructions provided by the manufacturer. For precise findings, controls and instruments that were calibrated were used. After being statistically examined, the study's statistics were displayed in clear percentages.

## RESULTS

A total of 4329 out of 173185 blood donors were found to be syphilis positive. At RBC Jamshoro, 1827 of the 75121 total blood donors tested positive for syphilis. Additionally, RBC Sukkur accepted 47438 blood donors, 1466 of them had positive syphilis tests. RBC Karachi reports that 538 blood donors out of 35797 tested positive for syphilis. Similarly, out of 14829 blood donors accepted at RBC Shaheed Benazirabad, 498 had syphilis. 1818 (99.5%) of the 1827 (42.3%) cases at RBC Jamshoro were male, while 9 (0.5%) were female. In contrast, RBC Sukkur recorded 1466 cases of syphilis (33.8%), of which 1462 cases (99.7% male) and 4 instances (0.3%) female. There were 536 (12.4%) male cases and 2 (0.4%)

female cases out of the 538 cases (12.4%) at RBC Karachi. However, 498 (11.5%) instances were recorded by RBC Shaheed Benazirabad, consisting of 3 (0.6%) women and 495 (99.4%) men. The age distribution of syphilis cases among blood donors showed that 3016 donors (69.6%) were between the ages of 25 and 40, while 782 donors (18.2%) were between the ages of 18 and 24. 531 (12.2%) of them were between the ages of 41 and 60.

## DISCUSSION

TTIs (hepatitis B, hepatitis C, human immunodeficiency Virus (HIV) AIDS, syphilis, and malaria) pose a serious risk to patient safety and make it difficult to provide high-quality blood and blood products at cost-effective rates in healthcare systems with little funding. The purpose of the present research was to estimate the prevalence of syphilis infection, which is the third most common TTI across blood donors of Sindh in the year 2022. The rising incidence of syphilis among blood donors is a significant public health issue since it may have detrimental effects on both the safe and healthy blood supply and the recipient's health.

The final results showed that 4329 blood donors throughout the RBCs of Province tested positive for syphilis out of a total of 173,185 blood donors. This suggests an overall prevalence of 2.5% Syphilis among blood donors in Sindh province. The findings of our investigation are consistent with 3.9% of syphilis cases reported in a 2019 survey conducted across many districts of Punjab.<sup>1</sup> However, our results considerably surpass the data from a nine-year study carried out at Karachi's Liaquat National Hospital where Syphilis was reported to be 0.91% among blood donors<sup>7</sup>, the main reason for this could be that the residents of this study were from Karachi, (large population with small disease prevalence), better socioeconomic status and single center of study. Syphilis prevalence in Mali, West Africa, was found to be 0.04% in a different study carried out in 2018<sup>8</sup>, the reason could be smaller sample size, a university hospital and better history taking.

Syphilis occurrence among blood donors was

found to be highest in RBC Sukkur and RBC SBA at 3%, followed by RBC Jamshoro at 2.4% and RBC Karachi at 1.5%, when the prevalence rates across other RBCs were compared. These results underline the necessity of increased screening and preventative initiatives, especially in areas where the incidence rates are greater.

Male donors were 171,725 while female donors accounted for 1,460 of the total number. In 2022, 4,311 cases or 2.5% of the male donors tested positive for syphilis. Conversely, just 18 or 1.2% of female donors tested positive for syphilis. There is a notable gender gap in Syphilis's prevalence, as seen by the number of Syphilis-positive patients by gender. Male donors made up 99.5% to 99.7% of the total across the regions, which included RBC Shaheed Benazirabad, RBC Sukkur, RBC Jamshoro, and RBC Karachi. Conversely, the proportion of female donors is extremely low, ranging from 0.3% to 0.5%. These findings concur with other research projects carried out in Pakistan.<sup>3,9-11</sup>

According to the current study's findings, there is a definite gender disparity in the prevalence of syphilis, with males in the analyzed regions disproportionately more affected than females. It's true that blood donation patterns may play a role in the discrepancy in the distribution of cases positive for Syphilis, but it's crucial to take other aspects into account as well. Male and female differences in biological and behavioral conduct, as well as access to healthcare resources, may also have an impact on the gender disparity in cases of syphilis. Additionally, patterns regarding disease prevalence may be shaped by social and cultural variables.

This STD is highly heterogeneous among blood donors based on their age, which is also a contributing factor. It was found that 69.6% of the cases occurred among donors between the ages of 25 and 40. As far as age groups are concerned, the next to have a higher percentage are those between 18 and 24 years of age (18.2 percent) and those between 41 and 60 years of age (12.2%). It is noteworthy that our findings are in agreement with the results of the European Centre

for Disease Prevention and Control's Annual Epidemiological Report for 2019, which stated that most syphilis cases occurred in individuals between the ages of 25 and 44.<sup>12</sup> Another study conducted in Northeast India found that people between the ages of 25 and 40 were the most likely to be infected with syphilis. Furthermore, these results contradict those of<sup>1</sup> and<sup>14-15</sup>, who discovered that those between the ages of 40 and 65 had the highest prevalence of syphilis.

The pattern of incidence raises the question of what factors such as extramarital sexual activity, limited access to healthcare, and a lack of knowledge about the disease—are responsible for the increased frequency of syphilis in the 25–40 age range. In order to lower the incidence of syphilis in this age group, further study is required to examine these determinants and create focused therapies.

Overall, the results emphasise how crucial it is to comprehend the demographic distribution of syphilis cases to inform Policy makers and other stakeholders to chalk down robust public health strategies and interventions on provincial and district levels for reaching out to the community till the last mile. Moreover, majority of the blood banks and blood centers are using RPR or ICT method for Syphilis testing, that has increase chance of false positivity as well as can miss the true positives, it is therefore essential to perform TPHA for Syphilis by using CLIA technique, which is more sensitive as well as specific for detection of *Treponema Pallidum*.

## CONCLUSION

To conclude, with an overall incidence rate of 2.5%, the prevalence of syphilis among blood donors in Sindh is a serious public health concern. Additionally, the results show that there is a gender difference in the prevalence of syphilis, with men being disproportionately impacted in comparison to women. Furthermore, there is a notable variation in the distribution of syphilis cases by age group, with the bulk of cases occurring in donors who are between the ages of 25 and 40.

These results highlight the necessity of increased screening and preventative initiatives for the general public as well as blood donors. To address the demographic distribution of syphilis cases, specific targeted interventions with implementation plans must be established, especially in areas where syphilis prevalence rates among blood donors are greater.

## RECOMMENDATION

It is advised that regional blood centers in Sindh conduct improved syphilis screening and preventive measures for blood donors considering the study's findings. This can entail spreading knowledge about syphilis, encouraging safe sexual behavior, and giving afflicted people access to testing and treatment. Targeted interventions should also be created to address the demographic distribution of syphilis cases, especially in areas with higher incidence rates and among young people. Based only on the prevalence rates among blood donors, it is challenging to determine the prevalence rate of syphilis in Sindh's general population. On the other hand, high rates among blood donors in Sindh can also point to a larger frequency in the general population. It is impossible to pinpoint the precise prevalence rate in the general population in the absence of any specific data that are currently available. To precisely determine the frequency of syphilis in Sindh's general population, extensive epidemiological research and surveillance would be necessary. Corrective action would then need to be taken for the disease's management, including treatment, control, and prevention and replacing CLIA testing in place of RPR.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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


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### AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Asma Jalbani	Origin of the concept, manuscript writing, final review.	
2	Dur E Naz Jamal	Data interpretation, helped in manuscript writing and final review.	
3	Samra Waheed	Data analysis, assisted in manuscript writing and final review of paper.	
4	Arpna Nihal	Concept design, data interpretation and review of the paper.	