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PREVALENCE OF SYPHILIS CASES AMONG BLOOD DONORS IN BOJONEGORO

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ABSTRACT

Syphilis is a disease caused by Treponema Pallidum. Syphilis can be transmitted through sexual intercourse and can also occur in the vertical direction from the mother to the fetus, through blood products, and in some cases, through medical equipment. Among those, blood transfusions are the leading way to spread the disease. The WHO estimates that more than 1 million people worldwide are diagnosed with 4,444 sexually transmitted infections daily. This study used a total of 51,351 blood samples obtained from blood donors in 2020 and 2021 in the Blood Donor Unit (UDD PMI) Bojonegoro. The aim of this study was to determine the prevalence of syphilis cases that occurred in the Blood Donor Unit (UDD PMI) Bojonegoro.. This study was descriptive study with a cross-sectional design and was conducted by using cross-tabulation as statistical analysis. The data showed a slight increase with 0.12% and 0.16% of confirmed syphilis in 2020 and 2021, respectively (P = 0,174 from statistical analysis). In total cases from 51,351 blood samples, 71 (0.14%) blood samples were positive for syphilis. The highest cases in 2020 occurred in January (seven cases) and the highest cases in 2021 occurred in October (13 cases). The conclusion of this study showed that the prevalence of syphilis was low in this study. Even though the percentage might be below 1% in this study, it is still a significant transfusion problem in blood donation quality to be overcome. The recommendation in this study was it still need to be aware of this infection and encourage to live the healthty and safety life.

Keywords: *blood donor, syphilis, transfusion-transmissible infection*

ABSTRAK

Sifilis adalah penyakit yang disebabkan oleh *Treponema pallidum*. Sifilis dapat menular melalui hubungan seksual, dan juga dapat terjadi secara vertikal dari ibu ke janin, melalui produk darah, dan dalam beberapa kasus melalui peralatan medis. Di antara mereka, transfusi darah adalah cara utama untuk menyebarkan penyakit. WHO memperkirakan bahwa lebih dari 1 juta orang di seluruh dunia didiagnosis dengan 4.444 penyakit menular seksual setiap hari. Penelitian ini dilakukan dengan menggunakan sampel darah sebanyak 51351 yang diperoleh dari pendonor darah pada tahun 2020 dan 2021 di Unit Donor Darah Palang Merah Indonesia, Bojonegoro. Tujuan dari penelitian ini adalah untuk mengetahui prevalensi kasus sifilis pada darah donor di UDD PMI Bojonegoro. Temuan ini diharapkan berimplikasi pada peningkatan kesadaran masyarakat akan penyakit sifilis. Penelitian ini menggunakan pendekatan kuantitatif dengan model deskriptif *cross sectional* yang dilakukan dengan menggunakan metode tabulasi silang sebagai analisis statistik. Data menunjukkan ada sedikit peningkatan kasus positif sifilis yaitu 0,12% dan 0,16% pada tahun 2020 dan 2021 berturut-turut (P = 1,74 berdasarkan analisis statistik). Dari 51.351 sampel darah, total sebanyak 71 (0,14%) sampel darah positif sifilis. Kasus tertinggi pada tahun 2020 terjadi pada bulan Januari (7 kasus) dan kasus tertinggi pada tahun 2021 terjadi pada bulan Oktober (13 kasus). Kesimpulan penelitian ini adalah prevalensi kasus sifilis dalam penelitian ini tergolong rendah dengan presentase dibawah 1%. Meskipun prosentase yang muncul tergolong kecil (<1%), hal ini tetap menjadi sebuah permasalahan dalam transfusi darah yang perlu untuk diperhatikan dan ditanggulangi. Saran dalam studi ini adalah masih perlu kewaspadaan yang tinggi terhadap infeksi sifilis dan di dukung dengan kampanye hidup sehat.

Keywords: donor darah, infeksi menular lewat transfusi darah, sifilis

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Introduction

Blood transfusion is a common medical procedure that is mostly used in hospitals or healthcare centers for a variety of purposes and saves people's lives.[1] Blood resources were obtained by a donor and given to the blood donor unit managed by the Indonesian Red Cross. In Indonesia, blood supply demand tends to increase and demand the safety and quality of blood products.[2] The need for safe, clinically effective, and quality blood products was due to the safety of patients, donors, healthcare staff, and society.[3] Therefore, as written in Permenkes No. 91 2015, every blood donor must be screened for potential Transfusion Transmissible Infections (TTI) such as Hepatitis B, Hepatitis C, HIV, and Syphilis.

Syphilis is one of the potential TTIs and is an ancient disease that is still a public health problem worldwide. The disease is experiencing a significant increase in several countries. [4] The first cases of transfusion-associated syphilis were reported in 1915 and 1941 with 138 cases.[5] Rimoin stated that syphilis is an endemic infection occurring in low-income countries. Meanwhile, in middle- and high-income countries the risk is less or less.[6] The World Health Organization (WHO) estimates that there will be around 7 million new cases of syphilis in 2020.[7] There is an continous increase of 10% of cases in both men, women worldwide.[8,9] over the past three decades, syphilis has new potential for morbidity, and mortality through its association with high-risk immunodeficiency virus (HIV) in humans.[5] Syphilis is a chronic infection. Caused by *Treponema pallidum* and can be transmitted through sexual contact, congenital, or through blood components.[10] most cases of TTI have the potential to occur when the donor is in the primary or secondary stage of disease.[11] Therefore, serological screening for syphilis is an important blood safety measure to avoid infection. This is because unsafe blood transfusion is very risky for donor recipients economically and humanitarian.[12]

Reported cases of syphilis vary worldwide. The average case of this disease occurs in countries on the African continent. This is due to the high prevalence of syphilis cases.[13] Countries that have a high prevalence rate are Sudan (14.8%); Angola (20%); and Nigeria (3.1).[10,14,15]In China, the prevalence of syphilis showed an increase from 2005 to 2017 with an average percentage of 1.15%. The country with the highest percentage is Iraq (1.46%).[12] In Iraq, more cases of syphilis attack the male gender than the female. There were about 233 cases out of 30,716 (0.76) that had positive syphilis status in Karbala City.[16] Research conducted by Sofro et al in Semarang City in 2008-2012 reported a prevalence of syphilis cases of 19.5% (5,800 samples).[17] The Indonesian Ministry of Health also reported that the number of syphilis cases in Indonesia from 2007-2016 experienced a significant increase.[18] The Bojonegoro Blood Donor Unit (UDD PMI) is an institution tasked with facilitating the supply and distribution of blood needs for people in the

Bojonegoro and surrounding areas. According to our knowledge there is no study conducted in Bojonegoro to determine the prevalence of infection of *T. pallidium* among blood donor and therefore, this study would take place to conduct. This study was aimed to find the prevalence of syphilis cases occurred in Blood Donor Unit (UDD PMI) Bojonegoro, so that this study was expected could increase the awareness of this disease caused by infection of *T. pallidium*.

Method

This research is using cross-sectional study by using retrospective review of blood donors collected from Blood Donor Unit (UDD PMI) Bojonegoro. This study used secondary data collected by Blood Donor Unit (UDD PMI) Bojonegoro from January 2020 until December 2021. Data population in this study was 51351 blood donors and we used total sampling. The selected donor was healthy according to their medical histories, fulfilled the suitability for blood donation, and have filled out the inform consent prior.

The donated blood was further serologically screened by using enzyme-linked immunosorbent assay (ELISA) (Bio-Rad SYPHILIS Total Ab) for *T. pallidium* infection. All blood donor that was positive in screening process were tested in duplicate for ensure the result reliability. Inclusion Criteria: All the population selected in this study includes physically healthy with hemoglobin no less than 12,5 g/dL, have a good pulse and blood pressure and allowed to donation. Donor has taken the administration questionnaire about risk factors for TTI, and included a clinical examination to further assess eligibility based on the Indonesian Red Cross Standard. Exclusion Criteria: Donors who had TTI positive in previous attempts would be recognized, not allowed to donate their blood and excluded for this study. while donor with TTI negative will treated as new donor. Statistical analysis: Data were statistically analyzed by using Cross Tabulation to determine the rates and percentages. The data was then analyzed by using Social Sciences Statistical System (SPSS, v.20).

Results

The total number of blood donor in 2020-2021 period in Blood Donor Unit (UDD PMI) Bojonegoro was 51351 (21260 in 2020 and 30091 in 2021) blood donors. Among 5131 blood donor who came to donate blood, 71 (0,014%) data on the results of the syphilis screening using ELISA test shown an increase in number of TTI cases. In 2020 the number of syphilis cases was 25 cases while in 2021 the cases were increased to 46 cases (Figure 1). Statistical analysis showed a significant correlation, $p < 0.05$.

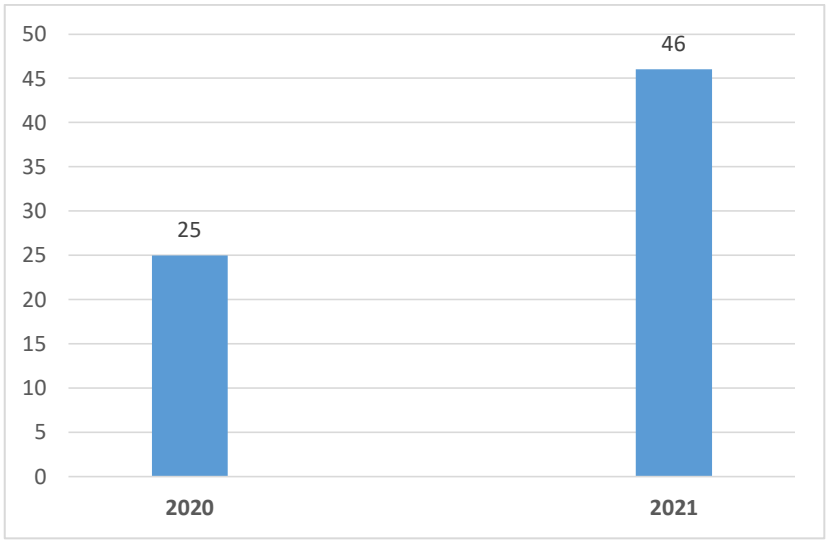

Figure 1. Confirmed *T. Pallidium* Infection Cases between 2020 and 2021

The increase in the number of cases of Syphilis is directly proportional to the increase in the percentage of events where in 2020 it is 0.12% and in 2021 slightly increases to 0.16%. (Table 1). The number of blood donor tested also increase from 21260 packs of blood donor in 2020 to 30091 packs of blood donor in 2021.

Table 1. *T. Pallidium* Infection Data at Blood Donor Unit (UDD PMI) Bojonegoro

Year	Donor	*T. Pallidium* Positive	Percentage (%)
2020	21260	25	0,12
2021	30091	46	0,16
TOTAL		**71**	**0,014**

In appearance, total sample tested in 2021 is larger than 2020. The average samples tested among 2020 was 1771,67 and in 2021 was 2507,58. Furthermore, the total cases occurred in 2021 was more than 2020 either. The most cases both in 2020 and 2021 seem occurred on October with total of 13 syphilis cases, followed by November, January, and June. The most samples tested in both 2020 and 2021 was on January (2,309 and 10,334 respectively), and the minimum number of samples tested was on May (1083) in 2020 and February (1099) in 2021 (Table 2.) According to statistical analysis, there is no correlation between number of cases with month and number of samples tested ($p>0,05$).

Table 2 below show that the largest number of cases and percentage of syphilis cases in 2020 occurred in January where there were 7 confirmed cases with a percentage of 0.3% and the smallest cases in May, July and October where there were no confirmed cases. In 2021 the highest number of syphilis cases was in October with a total of 13 confirmed cases with a percentage of 0.63% and smallest cases in 2021 were at the beginning of the year, February and March where there were no cases confirmed.

Table 2. Syphilis cases data in 2020-2021 (per month) N = 51351

Month	2020			2021			TOTAL	%
	Tested	Positive	%	Tested	Positive	%		
January	2309	7	0,30	10334	1	0,01	8	0,06
February	1533	3	0,20	1099	0	0	3	0,11
March	1831	2	0,11	1577	0	0	2	0,03
April	1768	3	0,17	2017	3	0,15	6	0,16
May	1083	0	0	1794	5	0,28	5	0,17
June	1926	1	0,05	2578	6	0,23	7	0,16
July	1401	0	0	867	1	0,12	1	0,04
August	1828	1	0,05	2073	6	0,29	7	0,18
September	1743	1	0,06	1701	1	0,06	2	0,06
October	2123	0	0	2064	13	0,63	13	0,31
November	2060	5	0,24	1874	6	0,32	11	0,28
December	1655	2	0,12	2113	4	0,19	6	0,16
TOTAL	**21260**	**25**	**0,12**	**30091**	**46**	**0,16**	**71**	**0,014**

Discussion

This study reported on two-year prevalence of Syphilis positivity in blood donor unit from Bojonegoro City. The data for this study was data from a screening test conducted by Blood Donor Unit (UDD PMI) Bojonegoro. The present study shows that the prevalence of *T. pallidium* infection positivity was increased from 0,12 in 2020 and 0,16 in 2021 (Table 2). Based on this study result, general trend shows increase of syphilis positivity in the donor has been observed within last two years. The prevalence of *T. pallidium* infection among blood donor in Indonesia showed that the prevalence was varied. The syphilis positivity cases observed in this study was considerably lower than those reported by Sofro et al, who observed syphilis positivity cases in blood donor unit in Semarang from 2008 to 2012.[18] The study shown that 1,138 (19,5%) of 5800 blood pack sample was confirmed in *T. pallidium* infection with the most cases occurred in 2011 with 298 (26,2%) cases and the lowest in 2008 with 115 (10,1%) cases. Even though, the trend of case increase was the same with this study.

Puspita et al, also have a similar result with our study, shown that syphilis positivity cases in West Lombok in 2020 also have an increase tend.[19] Another study conducted by Lestari &Saputro on Kudus City in 2020 also shown a similar result with this study.[20] These report also linear with the report of health minister of Indonesia that found the prevalence of syphilis cases from 2007 until 2016 was run into upward every year from 0,38% in 2007 to 0,77% in 2016.[17] From this increasing percentage of cases and report in Indonesia, it can be interpreted that cases of transmission of syphilis through blood transfusions are very serious matters and special treatment is needed to reduce transmission, especially through blood transfusions.

Confirmed case of infection of *T. pallidium* reported worldwide apparently also shows variation. In Ethiopia prevalence of syphilis was 145 (0,80%) from 17.810 blood samples in 2015-2019.[21] Another study on Sudan from 2017-2019 shown a high prevalence of syphilis which 1927 cases of 14819 (13%) with gradual increase annually.[10] In China, the prevalence of syphilis in

blood donor 0,36% to 1,46%.[22,12] In Europe region, study of incidence of syphilis in Canada from 2010-2015 find that the infection ranged from 5 to 9,3 cases per 100.000 population with total of 3321 cases reported.

An intensive study conducted to collect data of syphilis prevalence worldwide. In Africa, the prevalence of syphilis from five region was 6,5%, in Australia, overall rates of syphilis diagnoses increase to 6,7 cases per 100.000 persons. In China, there were three-fold increase of syphilis cases from 2005 to 2014 (135.210 to 441.818 cases total). On Europe, study conducted in 20 different country the percentage of syphilis prevalence was ranged from 0% to 9,6%[23] with the highest percentage from Serbia.[22] In Latin America, there was 2,6% syphilis prevalence occurred on Peru[24], 9,9% on Brazil[25], and 14,9 cases per 100 patients per year on Argentina.[26] On America, syphilis cases in 2013 to 2016 period were ranged from17,5 cases per 100.000 for white people, 23,1 cases per 100.000 persons for black people, and 10,9 cases per 100.000 persons for pacific Islander.[23] The different percentage obtained in other study of prevalence indeed affected by sample used in the study. But what we need to underlined was the tendency of increase found in each study. Compared to other study, we could say that the percentage of prevalence of syphilis occurred in Bojonegoro still relatively low. However, if the discussion is about people, still the expected number of confirmed cases was zero.

The current data in this study can be observed that the middle of the year of 2020 (May to October) shown a significant decrease in cases of syphilis. Just one or zero cases per month. This could have happened might be there was an Covid-19 pandemic and at that time occurred significant increase of covid cases reported in Indonesia. Prohibition on leaving the house, work from home regulation and various other restrictions applied in Indonesia. Bojonegoro indeed, applied a similar regulation. These could be significantly reducing public interest in donating blood at Blood Donor Unit, affecting the number of blood pack tested and explaining the decrease number of syphilis cases in the middle of 2020. In early 2021 (January, February, March) could be observed that there was an increase in number of blood pack entering the blood donor unit. Even though, the number of syphilis cases confirmed in early year 2021 was minimum (1, 0, 0 case respectively). This might indicate that donated blood was a healthy blood. However, in the year-end of 2021 (October, November, December) there was a significant spike of syphilis positivity cases (13, 11, 6 cases respectively). This certainly contra to the previous data in early year 2021.

The risk of transfusion-transmitted syphilis is closely related to risk factors in the blood donor, in particular sexual behavior. The rates of *T. pallidium* infection are high among homosexual men and frequently change sex partner.[27,28,29] Other risk factors were associated with transfusion-transmitted syphilis.[30,31] In Indonesia, there an increase tendency of syphilis prevalence to 10% in female sex workers, 35% of shemale people, and 2% of pregnant woman.[17] People who infected with *T. pallidium* through blood donation usually do not show any symptoms immediately

and would appear after several weeks afterward. The common symptoms appeared caused by infection of *T. pallidium* include palm macular lesion, arthalgia, fever, headache, peripheral lymphadenopathy and in certain cases, jaundice. In cases of transmission of syphilis through blood donation, *T. pallidium* could be transmitted from another people without showing any typical syphilis symptoms. Therefore, asking each donor whether they had a contact history with people with syphilis in 2 months would be important to do prior to blood donation process conducted.[5] These of course could strengthen the urgency to perform a screening test for each donor's blood to prevent transmission of syphilis through blood donation.

The finding in this study intended to reporting the actual cases of syphilis occurred in Bojonegoro City and might be implied to build an awareness for people on Bojonegoro specifically in order to not to be infected by *T. pallidium*. This study indeed has limitations. The short period of time used in this study, and this research did not differentiate between gender, age, and background.

Conclusion

In this study it was observed that the prevalence of syphilis among blood donor in Bojonegoro during study period. The prevalence of syphilis was low in this study. Even though the percentage might be below 1% in this study, it is still a significant transfusion problem in blood donation quality purpose. We recommend still need to be aware about this infection and encourage to live the health and safety life.

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Conflict of Interest:

There is no conflict of interest in this study.

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