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Original Research Paper

The description of syphilis examination results using the immunochromatography method based on gender and age

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Abstract
Syphilis is a sexually transmitted infection (STI) caused by the bacterium *Treponema pallidum*. Syphilis screening can be performed using the immunochromatography method. *Puskesmas* (Primary Health Center) Gondokusuman II, Yogyakarta Municipality, provides syphilis screening facilities using the immunochromatography method. This study aims to describe the results of syphilis screening using the immunochromatography method. This study employed descriptive quantitative. The sample of this study was the results of syphilis screening from January 2024 to June 2025 using the Slovin formula, and obtained results from 81 respondents. Based on this study, the results of syphilis screening were predominantly male aged 20-25 years (64.2%), compared to females (35.8%). A high percentage was found in men of productive age or adulthood. This age group has a high curiosity, so it tends to encourage trying new things. The high reactive results based on the results of the examination indicate the potential for infection to spread in the population. The conclusion shows that syphilis examinations in January 2024-June 2025 using the immunochromatography method were dominated by male gender aged 20-25 years or productive age and adult age.

Keywords: adulthood; immunochromatography; male; productive age; syphilis

1. Introduction

Sexually Transmitted Infections (STIs) are a relevant global health issue. These infections are transmitted through unsafe sexual intercourse and can seriously impact the health of individuals and society. With increasing sexual activity and a lack of knowledge about safe sex practices, the problem of STIs continues to rise in various regions. Sexually Transmitted Infections (STIs) can be transmitted by gonorrhea, syphilis, or hepatitis B virus/HIV. STIs can infect both men and women. Infection can cause reproductive tract infections. If not treated properly, these infections can lead to infertility and even mortality. Sexually Transmitted Infections (STIs) that frequently occur in the community include gonorrhea, chlamydia, condyloma, bacterial vaginosis, and syphilis (Anisa Putri Utami et al., 2025).

Syphilis is an STI caused by the bacteria *Treponema pallidum* (Futry Maysura & Nurmakiah Nurmakiah, 2025). Like other STIs, syphilis can increase the risk of Human Immunodeficiency Virus (HIV) transmission. For people with HIV/AIDS, syphilis increases the risk of HIV infection (Kitong et al., 2022). Syphilis is divided into early and severe stages. Early stages include primary syphilis, secondary syphilis, and early primary latent syphilis. Severe stages include severe latent syphilis and tertiary syphilis. The clinical description of the latent stage is asymptomatic, but it can be transmitted through sexual intercourse, blood transfusions, and vertically from mother to fetus. Although the latent stage is asymptomatic, some cases do develop symptoms (Fadhilah et al., 2023). The Indonesian Ministry of Health reported 20,783 cases of syphilis in Indonesia in 2022. Data from the Ministry of

Health explains that increased syphilis screening was one factor contributing to the surge. By age group, 63% of syphilis patients were aged 25-49; 23% were aged 20-24, and 6% were aged 15-19 (Kadatua et al., 2024).

A significant increase in syphilis cases was also seen in the Special Province of Yogyakarta (DIY). In 2020, there were 67 cases, then in 2021, there were 141 cases. In 2022, there were 333 cases, reaching 89 cases in early April 2023. Yogyakarta Municipality had the highest number of cases, followed by Sleman Regency with 66 cases in 2021 and 97 cases in 2022. These numbers demonstrate the increasing number of syphilis cases in the Special Province of Yogyakarta, which coincides with the rise in syphilis cases nationally (Bimantara & Irfani, 2024).

Research conducted by Putri et al. (2025) described the prevalence of syphilis from 2021 to 2023 at a primary health center in Sleman Regency. The study found that 2022 had the greatest variability and the widest range of values. However, 2021 showed the smallest variability. The median for 2023 was higher than in previous years. By gender, the number of male patients increased compared to female patients. Furthermore, there were more people of productive age than non-productive age.

Several serological tests for syphilis can be used for diagnosis, screening, and monitoring response to therapy. These tests include non-treponemal and treponemal. Non-treponemal tests include the Veneral Disease Research Laboratory (VDRL) and Rapid Plasma Reagin (RPR). Treponemal tests include the Treponema Pallidum Rapid (TP Rapid) and Treponema Pallidum Hemagglutination Assay (TPHA). The advantages of treponemal examinations (TP Rapid and TPHA) are that they have better specificity and sensitivity than non-treponemal examinations (Aliwardani et al., 2021) The examination conducted in this study applied the TP-Rapid immunochromatography method.

Immunochromatography is a quick and easy analytical method for detecting syphilis. This method uses the principle of separating and labeling antigens and antibodies in a sample. Immunochromatography syphilis testing has been performed in several laboratories due to its sensitivity of 93% and specificity of 98%. Analytical sensitivity is capable of detecting minimal amounts of a substance in the sample being measured (Harmoko et al., 2024).

Syphilis examination using immunochromatography is related to the availability of data in the field or at health facilities. Furthermore, it is related to the cost and time of the test. Research on syphilis testing using immunochromatography needs to be conducted in health facilities or primary health centers (*Puskesmas*) because *Puskesmas* are the leading primary health care facilities capable of reaching communities in remote and isolated areas. Furthermore, examination data at *Puskesmas* has not been widely analyzed in real-world settings, as research results are still largely conducted and collected from hospitals or large laboratories. This research is expected to contribute to improving diagnostic accuracy in *Puskesmas* laboratories. The results of syphilis testing using immunochromatography can be compared with standard methods, such as VDRL or TPHA. Based on the explanation above, this study aims to describe the results of syphilis testing using immunochromatography based on gender and age.

2. Research Method

This research design employed a quantitative descriptive study to describe the results of syphilis screening using the immunochromatography method at *Puskesmas* (Primary Health Center) Gondokusuman II in Yogyakarta Municipality. The sample consisted of 437 respondents who underwent syphilis screening between January 2024 and June 2025. The sample size was determined by meeting inclusion and exclusion criteria. Inclusion criteria included patients who underwent syphilis screening using the immunochromatography method between January 2024 and June 2025. Exclusion criteria included patients who underwent other screening methods. The sample size was determined

using the Slovin formula, obtaining 81 respondents with a 10% confidence interval. This means that the results are 90% representative of the actual population and have a 10% margin of error.

Data for this study were obtained from secondary data from medical records of examinations performed by the primary health center laboratory staffs. Syphilis examination by laboratory staffs was conducted by using samples in the form of serum or whole blood with sample preparation in the form of dropping 1 drop of sample on the test strip plus 1 drop of buffer, then waiting for 10-15 minutes and reading the results. The categories in this study included the results of the examination with interpretation Reactive (positive) if 2 lines appear (control and test), Non-Reactive (negative) if 1 line appears (control), and Invalid if no control line appears. Data analysis was carried out descriptively and quantitatively to determine the frequency distribution of syphilis examination results. This study has granted the ethical test with letter number 4779 / KEP-UNISA / VIII / 2025.

3. Results and Discussion

The study was conducted using examination data from January 2024 to June 2025. The syphilis examination data had met the inclusion criteria, namely patients who underwent syphilis examination using the immunochromatography method. The results obtained were respondent characteristics consisting of the frequency distribution of respondents by gender and age group, as well as the percentage of syphilis examinations using the immunochromatography method.

3.1.Respondent Frequency Based on Gender

Table 1 shows that the highest percentage of patients who underwent syphilis examination were male patients, namely 52 patients with a percentage of 64.2%.

Table 1. Frequency Distribution of Respondents by Gender

No.	Gender	Total	Percentage (%)	Results	
				Reactive	Non-reactive
1.	Male	52	64.2	17	35
2.	Female	29	35.8	0	29
	Total	**81**	**100.0**		

The results of the gender frequency of respondents who experienced reactive syphilis tests using the immunochromatography method at *Puskesmas* (Primary Health Centers) of Yogyakarta Municipality were conducted to determine whether gender influences the number of syphilis results. Based on Table 2, the results of the study indicate that males dominated in syphilis tests with a total of 52, a percentage of 64.2%, and reactive results in 17 respondents. This is in line with the research of Chan et al. (2022), which states that the highest frequency of gender is male, namely 71.74% and cases of ocular syphilis are dominated by male patients (80%) (Puspawati et al., 2023). A study also explains that it is very common in men, especially men who have sex with men (Lubis & Mellaratna, 2025). Gender influences the number of reactive results. Men have more results than women. This may be due to men engaging in more risky sexual behavior than women.

The higher number of reactive results and risky sexual behavior in men may be due to various factors, including men's higher mobility than women's. Men are more likely to change sexual partners (Chan et al., 2022). Men can also have sex with men (MSM), which is often associated with a surge in syphilis rates, consistent with research by Lubis & Melaratma (2025). The actualization of clinical symptoms of STIs in men can be more pronounced, thus utilizing more opportunities to check themselves at health facilities (Chan et al., 2022).

According to WHO data, syphilis tends to affect younger individuals more frequently, with a higher prevalence in men than women. Women's lack of information about sexual matters is often perceived as a sign of purity. This suggests that men are more knowledgeable about sexuality than women.

Women are perceived as more passive, while men are more active in seeking information about sexuality. Based on the causal factors mentioned above, it can be concluded that men are more likely to contract syphilis than women (Putri et al., 2025), so that men are considered to have a greater sense of free sex compared to women (Chan et al., 2022).

3.2.Respondent Frequency by Age Group

Table 2 shows the percentage of respondents who underwent the most syphilis examination using the immunochromatography method, namely patients aged 20-25 years, namely 40 with a percentage of 49.4%.

Table 2. Frequency Distribution of Respondents by Age Group

No	Age (Years)	Total	Percentage (%)	Result	
				Reactive	Non Reactive
1.	17-19	6	7.4	3	3
2.	20-25	40	49.4	9	31
3.	26-30	19	23.5	1	18
4.	31-35	13	16	4	9
5.	36-40	3	3.7	0	3
	Total	**81**	**100.0**		

The results of this study, in addition to discussing the frequency of sex, also show that age group influences the presentation of syphilis. The risk of STI infection increases with sexual activity among young people. Physical changes during puberty are a reaction to the emergence of sexual desire. Puberty, without proper guidance, can lead to risky sexual activity among adolescents. Nowadays, the increasingly free social life of young people makes sexual intercourse commonplace (Anisa Putri Utami et al., 2025).

The frequency of respondents in Table 2 shows that the 20-25 age group dominated syphilis testing, with 40 respondents participating, representing 49.4%, and 9 respondents received reactive results. This aligns with research by Harmoko et al. (2024), which found that immunochromatography testing for syphilis detection was dominantly performed on individuals aged 21-49. Research by Lukman & Selomo (2025) found that the highest rate of syphilis testing was found in adults (19-44 years old), with 97%. Furthermore, research by Chan et al. (2022) found that the highest rate of syphilis testing was found in the 17-25 age group, with 42.39%. Age group significantly influences the number of reactive results. The 20-25 age group is considered the peak age group for sexual activity. This peak age group has low awareness of prevention. Furthermore, this peak age group is often targeted for screening because it is included in the productive age group.

The distribution of respondents by age is predominantly in the productive age group or adults. This age group is characterized by a heightened sense of curiosity, leading to a tendency to try new things. Sexual activity is a major attraction for early and late adolescents. Late adolescents often seek out information related to sexuality and try to satisfy their curiosity without considering the future consequences (Lukman & Selomo, 2025). A quarter of the world's population is made up of people aged 10-24. According to Anisa Putri Utami et al. (2025), adolescents aged 15-19 and young adults aged 20-24 are the populations with the highest prevalence of STIs.

3.3.Respondent Frequency Based on Examination Results

Table 3 shows the results of syphilis examination using the immunochromatography method for 81 samples, with reactive results for 17 respondents (21%) and non-reactive results for 64 respondents (79%).

Table 3. Frequency Distribution of Respondents Based on Examination Results

No.	Gender	Total	Percentage (%)
1.	Reactive	17	21
2.	Non Reactive	64	79
	Total	**81**	**100**

Table 3 shows that 17% of respondents had reactive syphilis results using the immunochromatography method. Immunochromatography is a rapid test generally used for screening purposes. Reactive results can be obtained when the respondent is currently infected, has previously been infected, and is recovering (Harmoko et al., 2024). The immunochromatographic test has the advantage of being quick and tends to produce positive results. However, it can produce false-positive results. False-positive results can be caused by cross-reactions with other infectious or non-infectious diseases (Chomean et al., 2024).

Analysis of reactive results in immunochromatography studies is lower than non-reactive results. These reactive results can reflect the entire population. Research conducted by Fadhilah et al. (2023) demonstrated the high sensitivity of the immunochromatography method in detecting syphilis. The immunochromatography method has the advantages of easy testing, shorter time, samples with serum, plasma, or whole blood, no need for special equipment, and low cost. However, it has the disadvantage of being unable to distinguish between active and inactive infections. Furthermore, it cannot be used to assess treatment outcomes. Reactive results indicate the potential spread of infection in the population. Biological factors and sexual behavior play a crucial role in disease transmission. If there is a lack of regular screening, it will worsen the epidemiological situation, so further intervention is needed to reduce the frequency of infection (Iskandar & Reza, 2023).

Infected patients who test reactive can undergo a confirmatory serological test using the Treponema Pallidum Hemagglutination Assay (TPHA). The TPHA test is the gold standard for syphilis testing (Fadhilah et al., 2023). TPHA examination is also a serological examination to detect the presence of specific antibodies against *Treponema pallidum* in human serum (Sinaga & Said, 2019). The results of the TPHA examination can be read easily, and bacteria other than *Treponema pallidum* cannot be detected (Fadhilah et al., 2023). The TPHA test is specific for *Treponema* and *Treponema IgM* (19S). The TPHA test becomes reactive after primary syphilis has established itself and, once reactive, remains reactive for a long time, even if antibodies decrease after treatment (Sinaga & Said, 2019).

4. Conclusion

Based on the research conducted on syphilis screening results from January 2024 to June 2025, it can be concluded that the most reactive results were in men aged 20-25. This is due to risky sexual behavior and a lack of awareness of reproductive health. Practical implications for reactive respondents include confirmation with another treponemal test, namely TPHA. The immunochromatography method can be used as a routine syphilis screening method for patients with STI symptoms and high-risk populations such as sex workers. Special thanks are extended to the laboratory staffs at *Puskesmas* Gondokusuman II their assistance in data collection. Hopefully, the results of this study will be beneficial and serve as a reference for further research.

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