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2026 Volume 11, Issue 3
Advances in Precision Medicine
ISSN: 2424-9106 (Online)
ISSN: 2424-8592 (Print)

Analysis of HIV Antibody Testing Results in Huai'an District, Huai'an City from 2019 to 2023

Shanshan Shen*
Huai'an District Center for Disease Control and Prevention Huai'an 223300, Jiangsu, China

Author to whom correspondence should be addressed.

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Abstract: *Purpose:* To analyze the HIV antibody confirmation test results of our center from January 2019 to October 2023. There are a total of 33,836 cases of data. Based on the analyzed results and data, provide reliable data support and a scientific basis for subsequent disease treatment. *Methods:* The detection was carried out by enzyme-linked immunoassay and the colloidal gold method. *Results:* A total of 33,836 people were tested, and a total of 94 specimens were sent to the Huaian CDC for examination, of which 77 specimens were confirmed to be positive for HIV antibodies, with a detection rate of 0.23%. There were 62 male cases (80.52%) and 15 female cases (19.48%), with a higher number of males than females. Demographic characteristics show that the age group of confirmed positive patients is 20 to 40 years old, mainly involving young and middle-aged people; Han people account for 63.64%, ethnic minorities account for 36.64%, and the majority of confirmed HIV positive people are Han people; HIV confirmed positive people are mainly distributed in people of uncertain culture, accounting for 37.66%; married people account for 69.81%, and unmarried people account for 29.87%, mainly concentrated in married people. *Conclusion:* We should focus on strengthening the propaganda of AIDS prevention knowledge and behavioral intervention among the above groups, and enhance the prevention awareness of the current youth group.

Keywords: HIV antibodies; AIDS; Confirmatory experiments

Online publication: March 26, 2026

1. Introduction

AIDS (HIV) is a highly contagious disease caused by human immunodeficiency virus infection. It is transmitted through blood, mother-to-child transmission and sexual intercourse. The disease destroys CD4+T lymphocytes, leading to damage or deficiency in the body's immune function, leading to various opportunistic infections and malignant tumors, seriously threatening the life, health and safety of patients. In recent years, with changes in the social environment, the speed of population mobility has gradually increased, and the incidence of HIV has also increased. As an infectious disease, AIDS poses a great threat to public health and safety. Although AIDS is currently incurable, there is no cure for the disease, and there is no effective vaccine [1]. Early use of highly effective combined antiretroviral therapy can inhibit HIV viral replication and stabilize the patient's condition. HIV antibodies can be detected in the serum after HIV infection for a period of time. The window period is generally 2 weeks to 3 months, a few people can reach 4 months, and only a small number of patients exceed 6 months [2]. At present, the effective method is HIV antibody testing, which has become the basis for current monitoring and diagnosis of HIV-infected patients

and is also an effective way for early detection [3]. Conventional HIV testing methods mainly include primary screening tests and supplementary tests. Primary screening methods include enzyme-linked immunosorbent assay, chemiluminescence or immunofluorescence testing, rapid testing (RT) and other experiments; supplementary tests include Western blotting (WB), strip/linear immunoassay (RIBA/LIA), and nucleic acid testing, all of which can effectively detect infection [4]. Therefore, early screening of HIV-infected patients and early intervention can help improve the prognosis of patients. In order to prevent and treat AIDS, a summary analysis of HIV antibody test results from 2019 to 2023 is now conducted.

2. Materials and methods

2.1. Sample source

HIV antibody primary screening samples from our center from January 2019 to October 2023 were collected and analyzed, with a total of 33,836 cases. All patient specimens were collected by venipuncture in accordance with the operating specifications. 3–5 mL of venous blood was placed in a vacuum test tube with a coagulant and left to coagulate. After centrifugation at low speed for 5–10 minutes, the precipitated serum was collected as a sample to be tested.

2.2. Method

2.2.1. Instruments and reagents

Kendi F50 fully automatic enzyme-linked immunoassay instrument, Jingli LAZ5-2 centrifuge, screening positive samples were retested by the colloidal gold method and enzyme-linked immunosorbent assay (ELISA) method, respectively. This kit was approved and registered by the State Food and Drug Administration. At the same time, within the validity period, standardized use testing was carried out according to the instructions on the kit.

2.2.2. Operation steps

Take the HIV enzyme-linked immunoassay kit out of the refrigerator and place it at room temperature for more than 30 minutes. Set up the blank control, negative control, positive control, indoor quality control, and specimen wells according to the instructions. The colloidal gold kit can be used directly if it is stored at room temperature. The standardized operation is performed according to the SOP file. Both experiments are strictly performed in accordance with the reagent instructions. The experimental results are judged according to the reagent instructions.

2.2.3. Interpretation of test results

According to the screening situation, the methods used for the entire sample were the enzyme-linked immunoassay and the colloidal gold method. These two methods are currently the most effective ways to detect HIV. The colloidal gold method determines that the result is positive, and the enzyme-linked immunoassay method is used again to carry out the inspection procedure and decide. If the enzyme-linked immunoassay method still shows a positive result, the report form format is HIV infection to be determined, and the specimens are collected again and sent to the Huai'an CDC for confirmation experiments as required. This test was conducted in accordance with the national AIDS testing technical specifications, and the results were judged by conducting testing experiments according to professional guidelines and relevant instructions.

2.3. Statistics

All data were entered into an Excel database for statistical analysis.

3. Results

3.1. HIV antibody retest and confirmation results

From 2019 to 2023, our center conducted a total of 33,836 HIV antibody tests. The positive rate of HIV serum samples

was 0.23% (94/33836), and the confirmed positive rate of HIV-positive antibodies was 81.94% (77/94). Among the 94 samples that were initially screened positive, there were 20, 18, 11, 28, and 17 cases from 2019 to 2023, respectively. Among the 77 confirmed positive specimens, there were 18, 12, 7, 23, and 17 cases, respectively, from 2019 to 2023. The confirmed positive rates were 90.00% (18 /20), 66.67% (12/18), 63.64% (7/11), 82.14% (23/28), 100.00% (17/17). The testing status of each year is shown in **Table 1**.

Table 1. Preliminary screening, retesting and confirmation of HIV antibodies from 2019 to 2023 [n/%]

Year	Number of samples for preliminary screening testing	Number of positive samples for retesting	Number of confirmed positive samples	Confirmed positive rate (%)
2019	5321	20	18	0.34
2020	5844	18	12	0.21
2021	11227	11	7	0.06
2022	7623	28	23	0.30
2023	3821	17	17	0.44
Total	33836	94	77	0.23

3.2. Gender status among HIV antibody-positive people

The proportion of men is as high as 80.52%, while that of women is 19.48%. According to the data, among HIV-infected people, there are far more men than women (**Table 2**).

Table 2. Detection rates of HIV antibody-positive men and women from 2019 to 2023 [n/%]

Group	Number of test copies	Number of confirmed positives	Confirmed positive rate (%)
Male	15204	62	0.41
Women	18632	15	0.08
Tota	33836	77	0.23

3.3. Characteristics of HIV-infected people

The 77 confirmed positive cases from 2019 to 2023 are concentrated in the age group of 20 to 40 years old, mainly involving young and middle-aged people. Han people account for 63.64%, ethnic minorities or foreign nationalities account for 36.36%, and the majority of confirmed HIV positives are Han people. From the perspective of cultural level, the culture of HIV-positive people is mainly distributed among people with uncertain culture, mainly because patients are unwilling to disclose their cultural information. Unmarried people accounted for 29.87%, and married people accounted for 70.13%. Judging from the marital status, the majority were married. See **Table 3** for details.

Table 3. Demographic characteristics of HIV antibody-positive people [n/%]

Demographic characteristics	Number of positive cases	Composition ratio (%)
	Age distribution	
18–29	12	15.58
30–40	23	29.87
41–50	11	14.29
51–60	9	11.69
> 60	22	28.57

Demographic characteristics	Number of positive cases	Composition ratio (%)
	Nationality	
Han nationality	49	63.64
Minority or foreign nationality	28	36.36
	Education level	
Primary school	16	20.78
Junior high school	19	24.68
High school/technical secondary school	10	12.99
University	3	3.90
Unknown	29	37.66
	Marital status	
Unmarried	23	29.87
Married	54	70.13

3. Discussion

AIDS is the medical abbreviation of acquired immunodeficiency syndrome, in which human immunodeficiency virus (HIV) is the pathogen that causes AIDS. Once infected with HIV, the immune function will be impaired and an immune deficiency will occur, destroying the body's defense system, making the patient more susceptible to bacterial and viral infections, causing patients to develop a variety of diseases. Although there is currently no complete cure for AIDS, the use of antiretroviral drugs (ARVs) can effectively control viral replication and delay the progression of the disease [5,6]. Therefore, early diagnosis can ensure that patients receive treatment with these drugs as early as possible, thereby reducing the replication and spread of the virus in the body and improving the patient's quality of life and longevity. Through early diagnosis of patients, timely and effective treatment measures can be taken, including receiving appropriate drug treatment, changing lifestyle and behavior, and controlling the progression and spread of the disease. People infected with HIV are the source of AIDS infection. To prevent and control AIDS, it is necessary to screen HIV-infected patients in time to intervene as early as possible.

HIV antibody testing is currently an important method for clinical screening of HIV-infected patients. By detecting HIV antibodies in the patient's blood, it can be determined whether the patient is infected with the virus. HIV-1/HIV-2 antibody testing is a commonly used clinical screening method at present. Various HIV antibody immune detection technologies are usually used for diagnosis. For patients who are initially screened positive, the final diagnosis needs to be confirmed by the protein blot test of the Centers for Disease Control and Prevention [7]. In recent years, with the gradual increase in the incidence of AIDS, the incidence of positive patients in the region has also been gradually increasing, threatening the health of the people in the region. Therefore, it is very important to conduct a statistical analysis of HIV antibody test results in the region. Statistical analysis of the HIV antibody positive detection rate in the past five years shows that HIV infection is mainly in men, with more men than women, and most of them have a history of sex with men. This group will be the main group for HIV publicity and testing in the future [8]. The demographic characteristics of the 77 cases of HIV antibody positivity showed that the positive patients were concentrated in the age group of 20 to 40, mainly involving young and middle-aged people. This group of people is in the sexually active period, has a wide range of activities and social interactions, and is more likely to be infected with HIV. Some news media reported that this group is a high-risk group, especially young and middle-aged people with high energy and low educational level who are more susceptible to HIV infection through unsafe sexual intercourse [9]. Some people may also seek stimulation and inadvertently contract drugs, which may lead to a higher chance of contracting AIDS.

Heterosexual transmission, commercial sex partner transmission, alcoholism, and drug abuse are also risk factors

for HIV infection in this population [10]. We should not be careless about this group of people; they should be included in the scope of strict monitoring and management, and their HIV status should be continuously tracked. It is suggested that the student population is also the focus of AIDS prevention knowledge promotion in the next step. HIV has begun to spread among people who were considered relatively safe in the past [11]. Han nationality accounts for 63.64%, and ethnic minorities or foreign nationalities account for 36.36%. The propaganda of ethnic minorities cannot be ignored. From the perspective of education level, the culture of HIV-positive people is mainly distributed among people of uncertain culture; 29.87% are unmarried and 70.13% are married. From the perspective of marriage status, most of them are married. Married men and people with low educational levels have poor awareness of social publicity about AIDS and have become the main group of people infected with AIDS. AIDS prevention, knowledge, publicity and behavioral intervention should be strengthened. Testing coverage should be expanded, and HIV prevention publicity should be strengthened, especially for rural migrant workers and students. In addition, patients should pay special attention to the "window period" of HIV infection. When the human body is infected with HIV, the period of time during which AIDS antibodies can be detected in the blood is the window period. The normal period is 2 weeks to 3 months. During this period, no matter whether the blood test confirms HIV antibodies, it is still contagious. Therefore, after a patient has had high-risk sexual behavior or other transmission routes, if the test result is negative but the window period has not passed, the patient still cannot take it lightly. The body must be observed at all times until the window period is safely passed before the body can be diagnosed with HIV infection.

4. Conclusion

To sum up, the samples tested in this study were comprehensively measured based on the specific conditions of this region, and the measurement results have certain universal significance. For samples with uncertain HIV antibody confirmation tests, in addition to 2 to 4 weeks of follow-up and then antibody testing, nucleic acid testing with other high-risk behaviors and early cases is also crucial and an indispensable response strategy.

Disclosure statement

The author declares no conflict of interest.

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