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Some Biological Aspects of Serological Identification of Syphilis Among Blood Donors in Al-Muthanna -Iraq

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Abstract

The Syphilis test is one of the procedure tests utilized in the blood donor bank in Iraq, so the (TPHA) syphilis test helps diagnose syphilis, or check whether an individual has syphilis before any symptoms appear which helps treat the infection before it gets worse. For this, the study was performed in the Blood Bank in Al-Muthanna City, Iraq to diagnose syphilis. The blood samples were obtained from donors from Aug. 2023 to Mar. 2024. The detection of syphilis is performed by using the TPHA test to expose the hesitation of Syphilis disease amongst fine blood volunteer. The survey consisted of 160 donors, ages with 18 and 64 years at a mean age of 37, the positive of syphilis becomes visible in 24 (15%) at most and the number of positive males were 23 (14.3%) while 1(0.6%) were females, from which 136 (85%) were seropositive.

Keywords: Serological, Syphilis, *Treponema pallidum*, Blood donors

Introduction

Syphilis is a sexually inherited disease caused by the bacterium *Treponema pallidum*, a strain of *Bacteria pallidum*. The route of transmission of syphilis is always through sexual contraction, or from the mother to the embryo inside the uterus (Stokx *et al.*, 2011 and Ngassaki-Yoka *et al.*, 2018). Anstee (2010) share that the

disease affects approximately 12 million people annually, most of them in developing countries, its symptoms include skin rashes, heart problems, and sometimes the disease can be difficult to diagnose in its early stages. Syphilis analysis and early detection of *Treponema pallidum* infection can be performed through

a group of tests and analyses, including the following: Rapid plasma reagin test, Sexually Transmitted Disease Research Laboratory Testing, Rapid immunochromatographic test, Absorption test against fluorescent spirochetes, *Treponema pallidum* particle agglutination assay test (Tippie *et al.*, 2015 and Abdulaziz *et al.*, 2016). Gillen and Dunaev (2017) note that several tests help in diagnosing syphilis, in addition to analyzing syphilis for palladium antibodies through hemagglutination, such as the RPR test for syphilis. Ng *et al.*, (2014) refer that the TPHA analysis for syphilis is performed by drawing a blood sample from a vein in the individual's arm and collecting it in a special test tube for later analysis using special devices.

There are no risks when performing the Syphilis test for palladium antibodies, but there are some complications that the individual feels, such as tingling pain when inserting or removing the needle, minor bleeding, or swelling at the site of the needle, and it should be noted that these complications quickly disappear within a period of time short (Liumbruno and Franchini, 2013). The WHO reported that 13 million cases of syphilis cannot remain alive completely in stocked blood, which makes it necessary to certify safe transformation to save person's lives, also, 14 red blood cells roof have various blood group antigens that are arranged of (polysaccharides and proteins), (15ABO and Rh) factor are the generality significant ones among all antigens in blood (World Health Organization, 2011). In the latest decades, plenty of reports have explored the cooperation between blood groups and some epidemic diseases and cooperation with specified blood group antigens and pancreatic cancer risk (Wolpin *et al.*, 2010a). Other reports showed the cooperation of the ABO system with (ovarian cancer, malaria, and cerebral thrombosis) (Wolpin *et al.*, 2010b). Some blood categories can depict a receiver and Molecule for precise types of (bacteria, parasites, and viruses) engagement of these sure types of microorganisms and RBC membranes could be because of antigenic similarity, commitment through particular receptors, or adjustment of antibody response (Bedu- Addo *et al.*, 2014). This study aimed to survey syphilis in Iraqi blood donors, specifically in the Al-Muthanna province of Iraq, and to establish the relationship among blood groups and syphilis hitting (Gates *et al.*, 2011).

Methods and Materials

The survey study was conducted at the Blood Bank in Al-Muthanna City, Iraq. Blood samples were collected from 160 male and female volunteers between August 2023 and March 2024. Prior to testing, plasma specimens were prepared using EDTA (1.5–2.2 mg/mL) and stored at room temperature (15–30 °C). All volunteers were screened for syphilis using a commercial *Treponema pallidum* haemagglutination (TPHA) test kit. The testing procedure involved adding 20 µL of positive and negative control samples, followed by the addition of 100 µL of conjugate. The mixture was incubated at 37 °C for 60 minutes, then washed five times. Subsequently, 50 µL each of substrate A and B were added, and the mixture was incubated for another 15 minutes. Finally, 50 µL of stop solution was added, and the results were read at 450 nm.

Statistical analysis:

The cut-off value was calculated as: Cut-off = NC + 0.180. The study data were analyzed using SPSS v25. A probability value of $P < 0.05$ was considered statistically significant. The Chi-square test was used to determine significant differences among blood donors.

Result and Dissection

The study contain 160 donors, ages between 18-64 years with a mean age of 37. Seropositive of syphilis showed in 24 (15%), the number of positive males was 23 (14.3%) and 1(0.6%) females, from which 136 (85%) seropositive. as shown in Table (1,2) and Figure (1). During 6 weeks in 2023-2024, serums were given 160 for syphilis serology, these serums were screened in the Laboratory, and TPHA and FTA-ABS tests for fluorescent *Treponema* antibodies were done side by side on all serum reacting by the VDRL test and also on non-reactive serum from patients with a history revealing of syphilis about similar outcomes were gets from these tests when 26 reactive sera were detected in the 160 sera examined. The clinical stage of the disease and prior chemotherapy did not appear to alter the degree of reactivity of the (TPHA test1). These results confirm that the TPHA test is, therefore, as sensitive and specific as the (FTA-ABS) test It has the additional advantage that being simple to perform, can be readily automated and, therefore, may be potentially useful as a screening test for treponemal antibodies. This study was conducted in Iraq to correlate among syphilis and blood groups. Our study was performed in Al-Muthanna City. It was discovered that 24 (15%) blood

donors are infected with syphilis, this ratio is not approximately to that discovered in Al-Nasiriya south of Iraq there were 200 (0.71%) infected with syphilis (Al-Badry, 2014). Another study was also performed in Al-Nasiriya from 2010 to 2012 where the high in 2012 at 0.91% (AL-Erjan *et al.*, 2017). Olokoba *et al.*, (2009).found in his study also contrast the results of other studies conducted in different countries like Pakistan, the UK, the USA, Nigeria, India, and Iran.

Besides, a study performed in Thiqr of Iraq also found that infection with syphilis in males was 94.5% while in females was 5.5% (AL-Erjan *et al.*, 2017) In Iran, most blood donors were male in 9918 (95%), and 558 (5%) were female 28 of syphilis (Mohammed *et al.*, 2014) Liu *et al.*, (2019) recorded 20,510 cases of blood donation infected with syphilis out of 2,100,071 in Chengdu blood center during the period from 2005- 2017.

Table 1: Serological prevalence of syphilis among blood donors, and their relation with sex and age.

Factor (group)	No. of examined	No. of infected	Prevalence %	Value
Sex				
Male	153	23	15.03	-
Female	7	1	14.28	0.957
$\chi^2 = 0.0029$, df= 1 p-value= 0.957				
Age				
< 20years	4	0	0	-
>20- < 30 years	29	0	0	-
>30-< 40 years	64	10	15.62	-
>40-< 50 years	42	6	14.28	0.009
> 50 years	21	8	38.09	-
$\chi^2 = 23.42$ df= 4 p-value= 0.009				

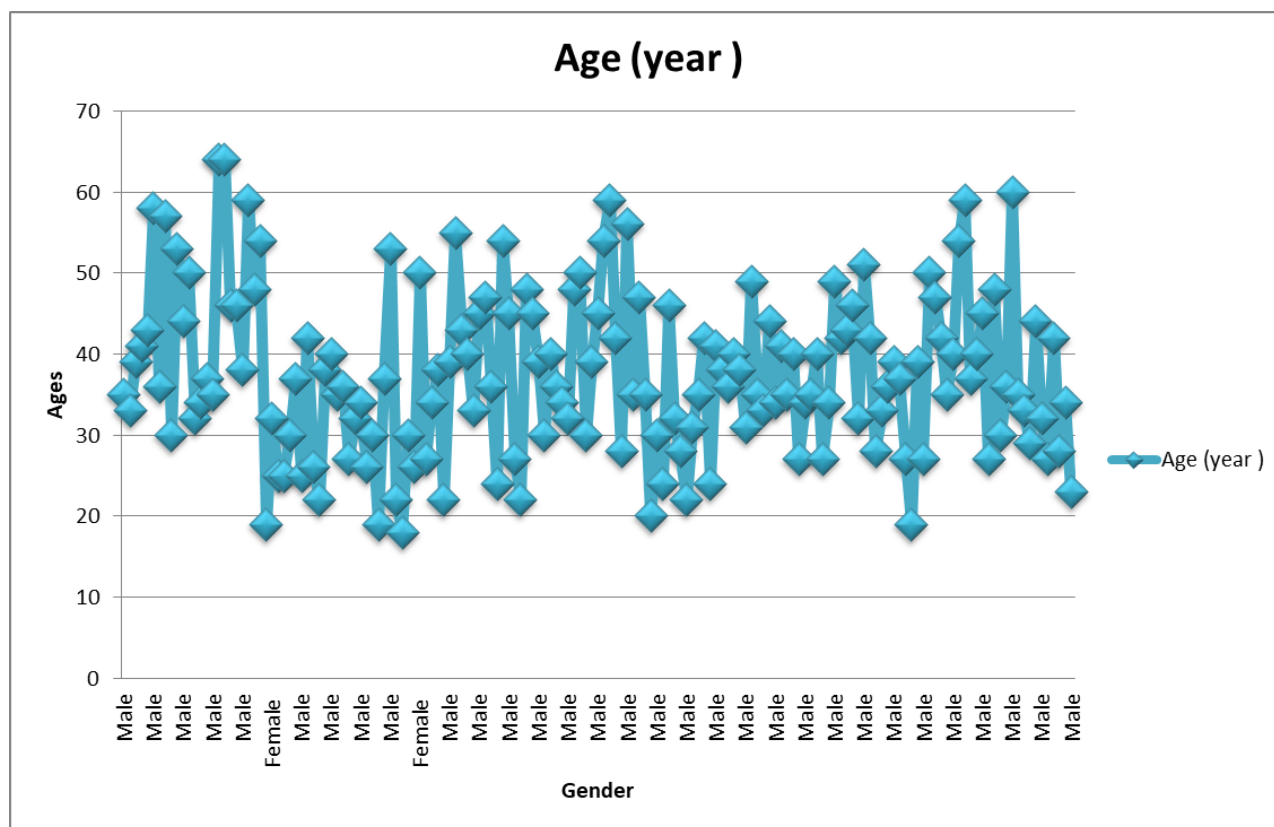


Figure 1: Serological prevalence of syphilis among blood donors, and their relation with sex.

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