

Assessing Hematologic Changes in Syphilis

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ABSTRACT

OBJECTIVE: The purpose of this descriptive study was to assess hematologic changes associated with syphilis and was conducted in the Shalamar Hospital (Lahore, Pakistan).

PATIENT AND METHOD: Total of seventy subjects (37 females, 33 males) were recruited for the study. Twenty (20) subjects (12 females, 8 males) were syphilis patients aged 20 – 38 years and fifty (50) subjects (25 females, 25 males) were the apparently healthy individuals aged matched with the patients. The fluorescent treponemal antibody absorption test is used as a diagnostic test for the confirmation of syphilis. Syphilis rapid test strip was used for the qualitative detection of antibodies to *Treponema pallidum* in each sample. Using Mindray BC-5300, hematological investigation was done.

RESULT: The result showed significant changes in the hematological parameters studied which could be the result of suppressed bone marrow activity, except for the basophil. The study indicated suppression in RBC, WBC, neutrophil, PCV, MCH and MCHC and hemoglobin and significant elevation in eosinophils, lymphocyte and monocyte of the syphilis subject as compared to the control.

CONCLUSION: Syphilis is a disease with extremely varied clinical manifestations. Practically all organs and systems may be compromised in its clinical stages. This study highlights that syphilis infection alter hematological parameters and this will ultimately help in diagnosis and treatment of patients. Timely diagnosis and treatment is necessary to prevent onward transmission and the development of irreversible tissue damage.

KEYWORDS: Hematologic Changes; Syphilis; Shalamar Hospital

Introduction

Syphilis, a genital ulcerative chronic infectious disease caused by the bacterium spirochaete *Treponema pallidum*, is usually transmitted by sexual contact or from mother to infant, although endemic syphilis is transmitted by non-sexual contact in communities living under poor hygienic conditions [1]. Risk of sexual transmission can be reduced by using a latex condom. It can also be transmitted by blood transfusion, perhaps the risk is low due to blood testing in many countries. In spite of provoking a strong humoral and cell-mediated immune response, it is able to survive in the human host for several decades. There are four stages of the disease: primary, secondary, latent, and tertiary (also termed as neuro-syphilis) [2].

A single intramuscular injection of long acting benzathine penicillin G (2.4 million units administered intramuscularly) will cure patient who has primary, secondary or early latent syphilis [3]. Three doses of long acting benzathine penicillin G at weekly intervals is recommended for individuals with late latent syphilis or latent syphilis of unknown duration. Treatment will kill the syphilis bacterium and prevent further damage, but it will not repair damage already done. The patients who have a severe penicillin allergy, doxycycline or tetracycline may be used and intravenous penicillin G potassium or ceftriaxone is recommended in patients associated with neuro-syphilis. It was strongly reported that during treatment people may develop fever, headache, chills and myalgia, a reaction known as Jarisch-Herxheimer [4].

It continues to cause morbidity and mortality worldwide. Report has shown that in 2015, about 45.4 million people were infected with syphilis [3], with 6 million new cases [4]. During 2015, it caused about 107,000 deaths, down from 202,000 in 1990 [5, 6]. After decreasing dramatically with the availability of penicillin in the 1940s, rates of infection have increased since the turn of the millennium in many countries, often in combination with human immunodeficiency virus [7, 8]. This is believed to be partly due to increased promiscuity, prostitution, decreasing use of

condoms, and unsafe sexual practices among men who have sex with men [9-11].

The disease starts as a painless sore — typically on your genitals, rectum or mouth and it spreads from person to person via compromised skin or mucous membrane contact with these sores [12]. Nonetheless, it can be passed by kissing near a lesion, as well as oral, vaginal, and anal sex [7]. About 30% to 60% of those exposed to primary or secondary syphilis will get the disease [13].

Patients and Methods

The purpose of this descriptive study was to assess hematologic changes associated with syphilis and was conducted in the Shalamar Hospital (Lahore, Pakistan). Our study powered at 80% and therefore has an 80% chance of being successful. Total of seventy subjects (37 females, 33 males) were recruited for the study using statistical software STATA. Twenty (20) subjects (12 females, 8 males) were syphilis patients aged 20 – 38 years and fifty (50) subjects (25 females, 25 males) were the apparently healthy individuals aged matched with the patients.

The following conditions were excluded on the basis of the history or relevant investigations: systemic lupus erythematosus, rheumatoid arthritis or any other autoimmune or collagen disease, antiphospholipid syndrome, drug addiction, liver disease, or malignancy where there is quite possibility of biological false positive (BFP) results.

Venereal disease research laboratory (VDRL) test is a non-treponemal test, used for the initial screening due to its simplicity, sensitivity and low cost. About 2ml of venous blood sample was collected from each participant into EDTA anticoagulated container following aseptic techniques. The fluorescent treponemal antibody absorption (FTA-ABS) test is used as a diagnostic test for the confirmation of syphilis. Therefore, syphilis rapid test strip was used for the qualitative detection of antibodies to *Treponema pallidum* in each sample.

Using Mindray BC-5300, hematological investigation was done so that patients were not suffering from any other

disease. The following parameters were investigated which include red blood cell, white blood cell, neutrophil, eosinophil, basophil, lymphocyte, monocyte, packed cell volume, mean cell volume, mean cell hemoglobin, mean cell hemoglobin concentration and hemoglobin.

Before initiation of the study, ethical approval was taken from the hospital as well as informed consents were obtained from the subjects and the confidentiality of the results were ensured throughout the period of the study. The results are shown in figure as well as also highlighted in table as mean and standard deviation and student t-test is used for the analysis and the level of significance was set at $P < 0.05$.

Results

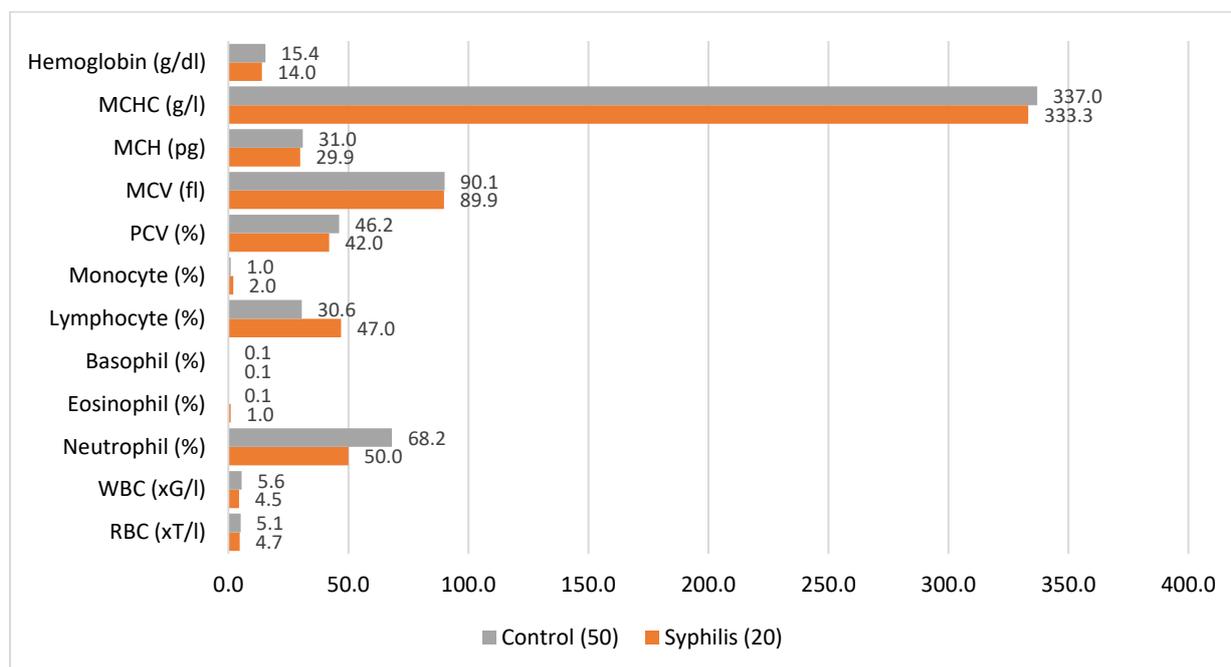
The results showed significant decrease ($P < 0.05$) in the RBC, WBC, neutrophil, PCV, MCV, MCH, MCHC and Hemoglobin of the syphilis subjects ($4.7 \pm 0.3 \times 10^{12}/l$, $4.5 \pm 0.6 \times 10^9/l$, $50.0 \pm 8.6\%$, $42.0 \pm 3.2\%$, $89.9 \pm 10.6fl$, $29.9 \pm 5.6pg$, $333.3 \pm 14.2g/l$, $14.0 \pm 0.5g/dl$) as compared to the control ($5.1 \pm 0.7 \times 10^{12}/l$, $5.6 \pm 0.8 \times 10^9/l$, $68.2 \pm 10.4\%$, $46.2 \pm 4.1\%$, $90.1 \pm 12.1fl$, $31.0 \pm 3.7pg$, $337.0 \pm 20.6g/l$, $15.4 \pm 0.8g/dl$) and significant increase ($P < 0.05$) in the eosinophil, lymphocyte, monocyte of the syphilis subjects ($1.0 \pm 0.1\%$, $47.0 \pm 5.2\%$, $2.0 \pm 0.1\%$) as compared to the control ($0.1 \pm 0.1\%$, $30.6 \pm 7.2\%$, $1.0 \pm 0.1\%$). There was no significant difference in basophil of the syphilis subjects ($0.1 \pm 0.1\%$) as compared to the control ($0.1 \pm 0.1\%$).

Table (1): Comparison of Hematologic Parameters of Syphilis Subject with Control

Parameters	Syphilis (20)	Control (50)	P-Value	Level of Significance
RBC ($\times 10^{12}/l$)	4.7 ± 0.3	5.1 ± 0.7	2.35	$P < 0.05$
WBC ($\times 10^9/l$)	4.5 ± 0.6	5.6 ± 0.8	5.14	$P < 0.05$
Neutrophil (%)	50.0 ± 8.6	68.2 ± 10.4	22.78	$P < 0.05$
Eosinophil (%)	1.0 ± 0.1	0.1 ± 0.1	10.75	$P > 0.05$
Basophil (%)	0.1 ± 0.1	0.1 ± 0.1	0.00	$P > 0.05$
Lymphocyte(%)	47.0 ± 5.2	30.6 ± 7.2	25.79	$P < 0.05$
Monocyte (%)	2.0 ± 0.1	1.0 ± 0.1	11.95	$P < 0.05$
PCV (%)	42.0 ± 3.2	46.2 ± 4.1	8.54	$P < 0.05$
MCV (fl)	89.9 ± 10.6	90.1 ± 12.1	0.23	$P < 0.05$
MCH (pg)	29.9 ± 5.6	31.0 ± 3.7	1.85	$P > 0.05$
MCHC (g/l)	333.3 ± 14.2	337.0 ± 20.6	3.49	$P > 0.05$
Hemoglobin(g/dl)	14.0 ± 0.5	15.4 ± 0.8	6.93	$P < 0.05$

RBC = Red Blood Cell; WBC = White Blood Cell; PCV = Packed Cell Volume; MCV = Mean Cell Volume; MCH = Mean Cell Hemoglobin; MCHC = Mean Cell Hemoglobin Concentration

Figure (1): Comparison of Hematologic Parameters of Syphilis Subject with Control



Conclusion

This study showed significant changes in the whole hematological parameters mentioned which could be the result of suppressed bone marrow activity, except for the basophil [14]. This study also shows that syphilis has a suppressive effect on the hematopoiesis which lead to reduced level of the hematological parameters studied in the syphilis subjects. The increased lymphocyte and monocyte may induce augmented release of cytokines which will affect the pathogenesis, prognosis as well as duration of the treatment [15].

It was reported that the striking clinical changes of early congenital syphilis include rash, severe rhinitis, moist lesions at muco-cutaneous junctions, painful limbs, lymphadenopathy and hepatosplenomegaly. Jaundice is common, as is hypoproteinemia which may cause edema. Anemia commonly persist as one of the hematological finding [14]. The incidence of thrombocytopenia is not clear, although the association of increased platelet turnover (with or without thrombocytopenia) with syphilis is well known. It has suppressive effect on the bone

marrow and may result to pancytopenia [15].

Hence, hematological parameters should be carefully monitored in the patients suffering from syphilis. As, it is known to be one of the sexual transmitted diseases and hence it has been remarkably shown that these type of diseases are increasing each day. Hematological tests are good indicators of health and disease state as well as one of the measures of prognosis for further treatment. This study highlights that syphilis infection alter hematological parameters and this will ultimately help in diagnosis and treatment of patients. To conclude, early diagnosis and treatment is advocated.

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