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# HAEMATOLOGICAL PARAMETERS AND SOME COAGULATION PROFILE IN MALARIA PATIENTS

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## ABSTRACT

**Background:** Malaria parasites belong to the genus plasmodium. There are approximately 156 named species of plasmodium which infect various species of vertibrate. Four are known to infect humans – p.falciparum, p.vivax, p. malariae and p.ovale. It transmitted by the bite of infected anopheles mosqutoes. Malaria can cause thrombocytopenia, leucopenia, leucocytosis, anaemia and intravascular coagulation or bleeding. **Objective:** the purpose of this study was to assess the CBC parameters and some coagulation profile in malaria and correlate parameters with parasite density , type of malaria parasite , age and gender of patient. **Materials and Method:** A case control study was done in 60 malaria patient (30 plasmodium falciparum and 30 plasmodium vivax ) and 30 normal control. Complete blood count was stimated by full automated mindary and the coagulation profile was tested by coagulometer. **Result:** CBC count and some coagulation profile was estimated by automation showed that HB, PLTS and HCT was significant decrease and affected by increasing of density ,RBCS and WBCs and MCHC was significant decrease but they are not affected by density MCHC was affected by type of malaria. Lymphocyte and granulocyte were significant difference between p.falciparum and plasmodium vivax (p.value <0.05). PT was significant prolongation in malaria and it was affected by increase of parasitaemia (prolong), but the PTT level was shorting and also affected by incrase of parasite density. **Conclusion:** The study concluded that different species of malaria (falciparum and vivax ) has profound hematological effect in sudanese patients, it can cause thrompocytopenia ,anaemia ,leukopenia, prolong PT and shorting APTT.

**KEYWORD**: Malaria, falciparum, vivax, CBC, PT, PTT, Mindary, Coagulometer, parasite density.

## INTRODUCTION

Malaria parasites belong to the genus plasmodium. There are approximately 156 named species of plasmodium which infect various species of vertibrate. Four are known to infect humans – p.falciparum, p.vivax, p. malariae and p.ovale It transmitted by the bite of infected anopheles mosqutoes. malaria continuous to be an important vector –borne disease with an annual morbidity of 4-5 million cases the incidance of malaria is increasing duo to resistance of vectors to insecticides and drug resistant parasites.[1] Of the four species that infect humans,p.vivax and p.falciparum account for 95% of infections. p.vivax has widest distribution, extending throughout the tropics, subtropics and temperature zones. plasmodium falciparum is generally confined to the tropics,p. malriae issporadically distributed, and p.ovale is rare in much of the world but relatively common in western Africa.[1] Malaria is endemic in Sudan estmated to be about 9 million episodes in 2002 and the number of death duo to malaria about 44,000. 2.877,000 dalys were lost in sudan in 2002 duo to malaria mortality, episodes, anemia and neurological sequelae.[2] Malaria can cause thrombocytopenia, leucopenia, leucocytosis, anaemia.[3] and intravascular coagulation or bleeding.[4]

### Objectives

### General objectives

To assess haematological parameters and some coagulation profile in malaria patients.

### Specific objectives

- To measure CBC parameters and some coagulation profile in malaria
- To correlate parameters with parasite density
- To correlate parameters with type of malaria parasite
- To correlate parameters with age and gender

## MATRIAL AND METHOD

### Study area and population

The study was conducted in Rebat University Hospital in Sudan –khartoum state –being ateaching hospital.

**Study design**
A case control study was done in a total of 60 patiend all of them were diagnosed with malaria parasite infection by thick blood film and ICT to determine species.

**Inclsion critria**
All the cases tested positive for falciparum or vivax malaria by prepheral smear in Rebat University Hospital.

**Exclusion criteria**
patients under malaria treatment.

**Collection of samples**
3 ml of Venous peripheral blood sample was collected in any tube of EDTA and sodium citrate anticoagulant from the malaria patients after tested by thick blood film and ICT for malaria The study included 60 patients blood sample(30 falciparum and 30 vivax) and 30 normal control.

**STATISTICAL ANALYSIS**
Data was analyzed manually and by using computer software(SPSS version 21) and the results was presented in graphs, charts Statistical values for $p < 0.05$ were considered significant ,and>0.05 were considered in significant

**RESULT**
Atotal of 90 samples collected in this study 57 males and 33 females( 30 plasmodium falciparum ,30 plasmodium vivax and 30 control ) ,the mean age of patients was 34.233 ± 12.71 years ,complete blood count was estimated for all samples using mindary BC-2800 hematological analyzer and coagulation profile was estimated by coagulometer analyzer.

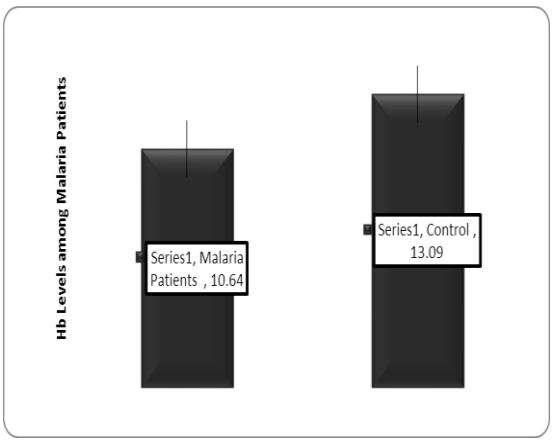


**Fig 1, hemoglobin level in malaria patient (falciparum and vivax) and normal control. The figure showed that hemoglobin level was significantly reduced in malaria patients when compared with normal subjects (P < 0.05)**

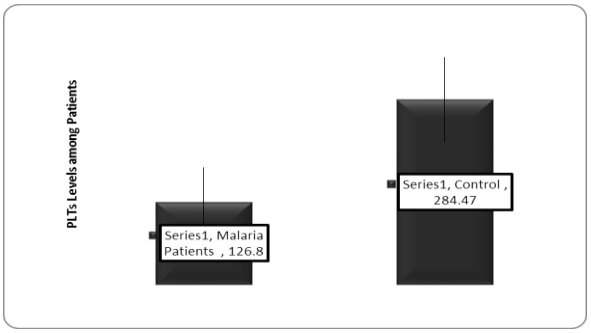


**Fig 2: pletelets count in falciparum and vivax malaria patiend with normal control. The above figure showed that platelet count was significantly reduced in malaria patients when compared with normal subjects (P < 0.05)**

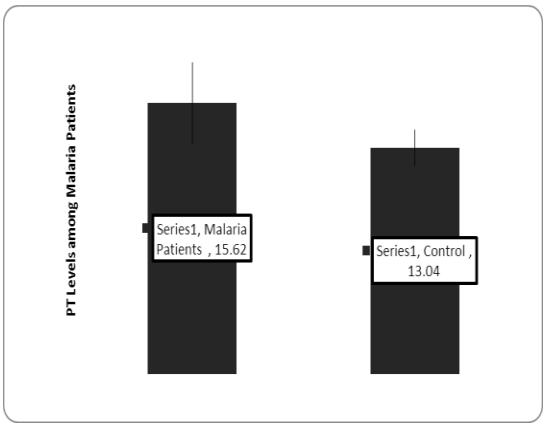


**Fig 3: prothrombin time level in malaria patiend (falciparum and vivax)And normal control. The above figure showed that PT was significantly prolongation in malaria patients when compared with normal subjects (P < 0.05)**

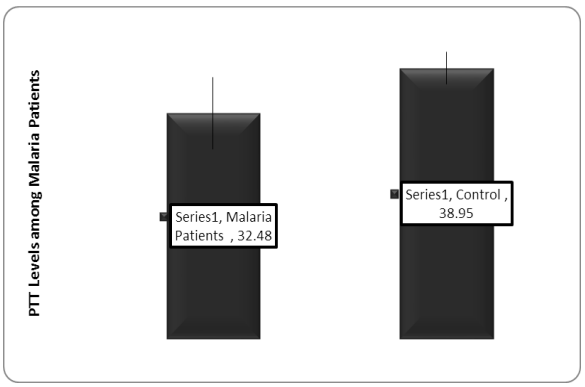


**Fig 4: Activated partial Thromboplastin Time in malaria patient (falciparum ,vivax) and normal control. The above figure showed that PTT was significantly shorting in malaria patients when compared with normal subjects (P < 0.05).**

**Tabel 1: Mean concertation level of heamatological parameters among malaria patients and control group.**

| | Grouping | N | Mean | *P-value* |
|---|---|---|---|---|
| WBCS | Case | 60 | 6.09±1.85 | 0.051 |
| | Control | 30 | 6.91±1.89 | |
| Rbcs | Case | 60 | 4.22±0.41 | 0.000 |
| | Control | 30 | 4.76±0.69 | |
| HCT | Case | 60 | 34.92±3.48 | 0.000 |
| | Control | 30 | 42.14±3.73 | |
| MCV | Case | 60 | 82.22±8.55 | 0.117 |
| | Control | 30 | 85.32±9.16 | |
| MCH | Case | 60 | 25.04±3.11 | 0.070 |
| | Control | 30 | 26.35±3.39 | |
| MCHC | Case | 60 | 30.45±1.07 | 0.019 |
| | Control | 30 | 31.01±1.04 | |
| LYMPH | Case | 60 | 30.07±14.72 | 0.180 |
| | Control | 30 | 26.14±8.54 | |
| MIX | Case | 60 | 9.27±2.29 | 0.124 |
| | Control | 30 | 8.51±1.95 | |
| GRAN | Case | 60 | 60.56±15.42 | 0.125 |
| | Control | 30 | 65.33±9.65 | |

In the table above, MCHC, HCT, total WBC and Rbcs counts were significantly decreased in malaria patients when compared with the control subjects ($P < 0.05$).

**Tabel 2: showing comparison of mean value of heamoglobin, platelets and some coagulation profile among falciparum and vivax malaria patients.**

| | Type | N | Mean | *p.value* |
|---|---|---|---|---|
| PTT | Falciparun | 30 | 32.38±5.01 | 0.882 |
| | Vivax | 30 | 32.58±5.35 | |
| PT | Falciparun | 30 | 15.13±1.03 | 0.110 |
| | Vivax | 30 | 16.10±3.12 | |

**Tabel 3: showing comparison of mean value of hematological parameters among falciparum and vivax malaria patients**.

| | Type | N | Mean | *P. value* |
|---|---|---|---|---|
| WBCS | Falciparun | 30 | 6.41±2.1 | 0.181 |
| | Vivax | 30 | 5.77±1.54 | |
| PLTS | Falciparum | 30 | 126.07±54.77 | 0.916 |
| | vivax | 30 | 127.53±51.96 | |
| HB | Falciparum | | 10.44±1.27 | 0.224 |
| | Vivax | | 10.84±1.27 | |
| Rbcs | Falciparun | 30 | 4.17±0.36 | 0.418 |
| | Vivax | 30 | 4.26±0.46 | |
| HCT | Falciparun | 30 | 34.60±3.41 | 0.492 |
| | Vivax | 30 | 35.23±3.57 | |
| MCV | Falciparun | 30 | 82.12±9.20 | 0.928 |
| | Vivax | 30 | 82.32±8.01 | |
| MCH | Falciparun | 30 | 24.78±3.26 | 0.513 |
| | Vivax | 30 | 25.31±2.98 | |
| MCHC | Falciparun | 30 | 30.09±0.95 | 0.008 |
| | Vivax | 30 | 30.80±1.08 | |
| LYMPH | Falciparun | 30 | 35.18±16.63 | 0.006 |
| | Vivax | 30 | 24.96±10.50 | |
| MIX | Falciparun | 30 | 9.69±2.20 | 0.153 |
| | Vivax | 30 | 8.84±2.33 | |
| GRAN | Falciparun | 30 | 54.90±16.37 | 0.004 |
| | Vivax | 30 | 66.21±12.24 | |

**Tabel 4: showing comparison of mean value of some coagulation profie related to malaria parasites density**.

| | | N | Mean | P .value |
|---|---|---|---|---|
| PTT | + | 22 | 35.7773±4.18 | 0.007 |
| | ++ | 25 | 31.8040±4.79 | |
| | +++ | 13 | 28.1846±3.51 | |
| PT | + | 22 | 14.5136±0.95 | 0.226 |
| | ++ | 25 | 15.5280±1.11 | |
| | +++ | 13 | 17.6538±4.05 | |

**Tabel 5: showing comparison of mean value of heamatological parameters related to malaria parasites density**

| | | N | Mean | P .value |
|---|---|---|---|---|
| WBCS | + | 22 | 6.4864±2.003 | 0.562 |
| | ++ | 25 | 5.9280±1.79 | |
| | +++ | 13 | 5.7231±1.70 | |
| PLTS | + | 22 | 171.0000±42.05 | 000 |
| | ++ | 25 | 123.0800±27.98 | |
| | +++ | 13 | 59.1538±23.43 | |
| HB | + | 22 | 11.5182±1.50 | 000 |
| | ++ | 25 | 10.1880±0.697 | |
| | +++ | 13 | 10.0154±0.88 | |
| Rbcs | + | 22 | 4.3182±0.44 | ..267 |
| | ++ | 25 | 4.1360±0.39 | |
| | +++ | 13 | 4.2000±0.36 | |
| HCT | + | 22 | 37.3091±4.01 | 0.001 |
| | ++ | 25 | 33.8160±1.92 | |
| | +++ | 13 | 32.9769±2.6 | |
| MCV | + | 22 | 85.4091±8.24 | .297 |
| | ++ | 25 | 81.7120±9.056 | |
| | +++ | 13 | 77.7923±6.03 | |
| MCH | + | 22 | 26.2409±3.10 | .197 |
| | ++ | 25 | 24.7200±3.14 | |
| | +++ | 13 | 23.6308±2.38 | |
| MCHC | + | 22 | 30.7818±1.17 | .148 |
| | ++ | 25 | 30.1960±0.933 | |
| | +++ | 13 | 30.3538±1.06 | |
| LYMPh | + | 22 | 33.2727±18.51 | .640 |
| | ++ | 25 | 29.3880±12.7 | |
| | +++ | 13 | 25.9538±10.12049 | |
| MIX | + | 22 | 9.4909±2.32 | .750 |
| | ++ | 25 | 9.0000±2.31 | |
| | +++ | 13 | 9.4000±2.30 | |
| GRAN | + | 22 | 57.2364±19.18 | .640 |
| | ++ | 25 | 61.2920±13.28 | |
| | +++ | 13 | 64.7538±11.48 | |

**DISSCUSSION**

In this study haematological parameters and some coagulation profile where assessed in adult hood with mean age( 34.2±12.7) years suffering from two types of malaria infection ( falciparum and vivax ) with the aim of finding out the effect of malaria on the parameters.

Male predominant (66.6%) was seen as the percentage 66.14% of male comparison with female in a studu done by **Prashant Patel et al – 2013.**[5] can be attributed to the male dominated social system where asick male gets perferential medical attention.

Result obtained show statistical decrease of heamoglobin level, the mean of it was (10.64±1.27), in (10.44±1.27) in falciparum compare to10.84±1.27) in vivav p. value (0.224)

Anemia was seen in 63% of the total patients like the study done by **Dr. Mohan. Kashinkunti** et al[10], it was 69%. The hemoglobin level is sligtly lower in female (10.5±1.4) in comparison to male (10.6 ±1.1). value (0.753) it was lower than observed by **Rajesh chetiwal et al 75%-2015-10.**[6]

In this study, the mean WBC count did not show a deviation from the normal reference range in tested types of malaria. This is similar to the results reported by **Bashawri et al[8] and also reported by Sawsan Bakhubaira.**[9]

Leukopenia was present in (11.6) of patients similar in male and female, but there is slight decrease in p.vivax (5.77±1.54) more the count in falciparum (6.41±2.1) p. value (0.181).

Thrombocytopaenia often accompanies malaria and is usually mild to moderate and very rarely symptomatic. Thrombocytopenia was observed in (73%) of patients, mean platelets count was (126±52.9) (p. value 0.000). similar results was observed in 88% of patients in study done by **Rajesh Chetiwal-2015-10[6].** where it was seen in (58%) patients in a study done by **Jayashankar CA et al- 2016[7].** Experimental data and clinical studies have successively emphasised the rule of immune factors and the distruction and sequestration of platelets.

There is a prolongation of PT in (51.6) of patient the mean of it was (15.62±2.35) and incrase with the increase of parasitaemia similar result was observed in 34% of patients in study done by **Jayashankar CA et al**[7], and the mean of PT was 15.8 sec in study done by **B.B. Lakhkar** et al.[11]

The APTTin malaria infection was short in 73.3 % of patients in the mean ((32.48±5.14) in the simalr study done by **B.B. Lakhkar** et al[11], the APTT was done twice and was extremely low (less than 5seconds) , but in other study done by **Jayashankar CA et al** the APTT was increase in 12% of patients.

MCV, MCH, MIX count were no significant difference among malaria infection.
MCHC is decrease in the malaria infection and it was significant decrease in plasmodium falciparum more than plasmodium vivax p. value (0.008).
There is significant increase of lymphocyte count in falciparum malaria more than its count in vivax type (p.value 0.006) but all in normal range.
There is significant decrease of neutrophil count in falciparum malaria less than its count in vivax type (p.value 0.004) but all in normal range.

There is no effect ofage on prothrombin time level activated partial thromboplastin level, and hematological parameters in malaria infection.

## CONCLUSION

The study concluded that different species of malaria (falciparum and vivax) has profound hematological effect in sudanese patients, it can cause thrompocytopenia, anaemia, leukopenia, prolong PT and shorting APTT

### Recommendation

We recommended that; malaria patients needs to following the complete blood count and coagulation profile to avoid the complication of anemia , thrombocytopenia, and evidence of disminated intravascular coagulation .

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