



**ASSOCIATION BETWEEN MALARIA PARASITE INFECTION AND PLASMA VWF  
LEVEL AMONG SUDANESE PATIENTS IN KHARTOUM 2017**

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**ABSTRACT**

Von Willebrand factor (VWF) is a large sialoglycoprotein, which circulates in normal plasma as a series of heterogeneous multimers and plays a critical role in primary hemostasis by mediating platelet adhesion to exposed collagen at sites of vascular injury. This study aimed to evaluate the vWF level among Sudanese malaria patients. A total of 40 samples were collected (23 males and 17 female) from malaria patients (27 with *P.falciparum* and 13 with *P.vivax*). The vWF level was measured using Enzyme linked immunosurpent assay (ELISA) .Data was analyzed by statistical package for social science (SPSS). The results of the current study showed that there is no significant association between malaria infection and plasma vwf level (*P-value*: 0.148). According to our result there is no association between malaria infection and plasma vwf level.

**KEYWORDS:** Von Willebrand factor, Malaria.

**INTRODUCTION**

Von Willebrand factor (VWF) is a large adhesive glycoprotein synthesized by endothelial cells and megakaryocytes, that circulates in the plasma as a series of heterogeneous multimers.<sup>[1,3]</sup>

VWF has two major functions in hemostasis. First, it is essential for platelet-subendothelium adhesion and platelet-to-platelet interactions as well as platelet aggregation in vessels in which rapid blood flow results in elevated shear stress. Second, VWF is the specific carrier of factor VIII (FVIII) in plasma and protects it from proteolytic degradation, prolonging its half-life in circulation and efficiently localizing it at the site of vascular injury.<sup>[4]</sup>

While a deficiency of VWF is responsible for a hemorrhagic diathesis (von Willebrand disease, VWD)<sup>[5]</sup>, there are increasing evidences that elevated VWF levels represent an important thrombotic risk factor.<sup>[6,7]</sup>

Von Willebrand factor (VWF) is a large sialoglycoprotein . VWF circulates in normal plasma as a series of heterogeneous multimers and plays a critical role in primary hemostasis by mediating platelet adhesion to exposed collagen at sites of vascular injury. The multimeric composition of plasma VWF plays a key role in determining its functional activity. In particular, high-molecular-weight multimers of VWF demonstrate enhanced binding affinities for both collagen and platelets and are therefore more efficient in mediating

platelet recruitment. Following synthesis within EC, VWF is either constitutively secreted into the plasma or else stored within specific intracellular organelles known as Weibel-Palade (WP) bodies. This WP-stored VWF is enriched in high-molecular-weight multimers and is actively secreted following EC activation.<sup>[8]</sup>

Malaria is a mosquito-borne infectious disease affecting humans and other animals caused by parasitic protozoans (a group of single-celled microorganisms) belonging to the Plasmodium type.<sup>[10]</sup> Malaria causes symptoms that typically include fever, tiredness, vomiting, and headaches.<sup>[9]</sup> In severe cases it can cause yellow skin, seizures, coma, or death.<sup>[9]</sup> Symptoms usually begin ten to fifteen days after being bitten.<sup>[10]</sup> If not properly treated, people may have recurrences of the disease months later.<sup>[10]</sup> In those who have recently survived an infection, reinfection usually causes milder symptoms.<sup>[9]</sup> This partial resistance disappears over months to years if the person has no continuing exposure to malaria.<sup>[9]</sup>

The disease is most commonly transmitted by an infected female Anopheles mosquito.<sup>[10]</sup> The mosquito bite introduces the parasites from the mosquito's saliva into a person's blood.<sup>[10]</sup> The parasites travel to the liver where they mature and reproduce.<sup>[9]</sup> Five species of Plasmodium can infect and be spread by humans.<sup>[9]</sup> Most deaths are caused by *P. falciparum* because *P. vivax*, *P. ovale* and *P. malariae* generally cause a milder form of malaria.<sup>[10][9]</sup> The species *P. knowlesi* rarely causes disease in humans.<sup>[10]</sup> Malaria is typically diagnosed by

the microscopic examination of blood using blood films, or with antigen-based rapid diagnostic tests.<sup>[10]</sup> Methods that use the polymerase chain reaction to detect the parasite's DNA have been developed, but are not widely used in areas where malaria is common due to their cost and complexity.<sup>[11]</sup>

## METHODOLOGY

This is a cross sectional study carried out in Khartoum state in the period from April to June 2017. A total of 40 samples were collected (23 males and 17 female) from Sudanese malaria patients, pregnant women and thyroid disease patients were excluded from the study. Three milliliter of blood was collected from each subject by clean venous puncture into sample container; containing 0.5ml of 3.8% trisodium citrate for the estimation of vWf:Ag. The samples for the determination of vWf:Ag were centrifuged immediately at 4000 rpm for 15 minutes and plasma extracted into sterile plain bottles.

The vwf level was measured using ELISA (TECHNOZYM); 50 ml of plasma were pipetted with 50 ml of conjugate, incubated in 37 for 45 min, wahed 3

times then 100 ml of the substrate were added, incubation for 15 min at room temperature after that 100 ml of the stop solution were added and read at ELISA reader 450 nm. Data were analyzed by statistical package for social science (SPSS) software using one sample T test.

## Ethical consideration

Samples were collected after verbal approval of the patients. Ethical approval was obtained from Al Neelain University ethical review board.

## RESULTS

The result of our study showed the mean of vwf among the cases is 0.959 U/ml which is within the normal range (0.5-1.5 U/ml). There is no significant association between malaria infection and plasma vwf level according to our result (p-value=0.148). Also there is no significant association between plasma vwf level and gender of the patients (p-value 0.409). Finally our result showed no significant association between vwf and malaria species (p-value=0.110). see table (1).

Table (1)

VWF (U/ml)	N	Mean±SD	P-value
VWF (0.5-1.5)			
Cases	40	0.959	0.148
Gender			
Male	23	0.979±0.181	0.409
Female	17	0.931±0.175	
Species			
P.Falsiprum	27	0.930±0.191	0.110
P.Vivax	13	1.017±0.136	

## DISCUSSION

The result of our study showed no significant association between malaria infection and plamavwf level according to our result (p-value=0.148), which disagrees with O'Regan N *et al* who stated that Plasmodium falciparum malaria infection is associated with an early marked increase in plasma von Willebrand factor (VWF) levels.<sup>[8]</sup> Also our findings contradicts Angchaisuksiri *et al* result which reported that Elevated plasma levels of von Willebrand factor (vWF) has been reported in P. falciparum-infected patients. It has been demonstrated that severe P. falciparum infection is associated with acute endothelial cell (EC) activation, abnormal circulating ultralargevWFmultimers and a significant reduction in plasma ADAMTS13 function.<sup>[12]</sup> Finally our result disagree with Phiri HT *et al* who reported in children with malaria, plasma VWF and propeptide levels are markedly elevated in both cerebral and mild paediatric malaria, with levels matching disease severity, and these normalize upon recovery.<sup>[13]</sup> this difference between the current study results and other puplished reports may be related to variation in sample size which is small in our study due to limitation in resources.

## CONCLUSION

In summary we conclude that according to our result there is no association between malaria infection and plasma vwf level in Sudanese patients.

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