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The Effect of Covid-19 Astrazeneca Vaccines on Some Coagulation Profile (Pt, Aptt) Among Sudanese Two Dose Vaccinated

Amged Hussein Abdelrhman*, Ahmed Hosham , Duaa Sala , Marwan Adel , Nadeen wahbi , Sara Abdelrahim and Waad Abdullah

Department of Hematology and Immunohematology, Elrazi University, Sudan

ABSTRACT

Background: The coronavirus disease 2019 (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the most formidable challenge to humanity in a century. It is widely believed that pracademic normalcy will never return until a safe and effective vaccine strategy becomes available and a global vaccination programmed is implemented successfully.

Design: This descriptive (case – control) analytical study carried out in Sudanese from June to December 2021 to determine the effect coagulation profile between AstraZeneca vaccinated and non- vaccinated.

Materials and Methods: whole blood sample collected in Trisodium Citrate anticoagulant from 500 vaccinated case and 500 control non vaccinated, PPP prepared and the tests was carried out using coagulometer,

Objective: This study aimed to evaluate some coagulation profile (PT, APTT and INR) among Sudanese AstraZeneca vaccinated.

Results: The result show significant different between case and control in (PT, APTT and INR) and significant different between male and female in (PT, APTT). Conclusion: This study concluded that the statistically significant different in (PT, APTT and INR) between vaccinated.

***Corresponding author**

Abdelrhman AH, Department of Hematology and Immunohematology, Elrazi University, Sudan. Tel: 00249929485305;
E-mail: amgedhussen66@gmail.com

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Introduction

The coronavirus disease 2019 (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the most formidable challenge to humanity in a century [1]. It is widely believed that pracademic normalcy will never return until a safe and effective vaccine strategy becomes available and a global vaccination programmed is implemented successfully [2]. Here, we discuss the immunological principles that need to be taken into consideration in the development of COVID-19 vaccine strategies. On the basis of these principles, we examine the current COVID-19 vaccine candidates, their strengths and potential shortfalls, and make inferences about their chances of success [1]. Complex, interrelated systems exist to maintain the fluidity of the blood in the vascular system while allowing for the rapid formation of a solid blood clot to prevent hemorrhaging subsequent to blood vessel injury. These interrelated systems are collectively referred to as hemostasis. The components involved in the hemostatic mechanism consist of vessel walls, platelets, coagulation factors, inhibitors, and the fibrinolytic system. In the broadest sense, a series of cascades involving coagulation proteins and enzymes, as well as cell surfaces (platelets and endothelial cells), work together to generate thrombin, the key enzyme in coagulation, subsequently leading to the formation of a fibrin clot. However, there also exist direct and indirect inhibitors of thrombin to ensure that clot formation does not go uncontrolled. Once the fibrin clot is formed, the fibrinolytic system ensures that the clot is lysed so that it does not become a pathological complication. Taken together, the systems exist to balance each other and maintain order. The balance of coagulation and fibrinolysis keeps the hemostatic system functioning efficiently [3].

In addition, the activated partial thromboplastin time (APTT) and prothrombin time (PT) have three principal uses. In screening for coagulation disorders (or increased risk of postoperative hemorrhage), the tests add no information to the preoperative care of patients without clinical findings indicative of increased bleeding risk [4]. Furthermore, the prevalence of asymptomatic congenital coagulopathies is so low that false-positive test results greatly outnumber true positive results. Thus, clinicians may use clinical assessment to screen and should reserve coagulation tests to investigate patients with abnormal findings. In evaluating abnormal bleeding, these tests are sufficiently sensitive that if both are negative, further investigation of the coagulation system is obviated. If one or both tests are positive, the pattern of results directs further attention to limited segments of the coagulation sequence. In monitoring anticoagulation therapy, the APTT and PT tests appear to contribute to the safety and effectiveness of heparin and warfarin therapies, respectively [5,6]. In coronavirus disease 2019 (COVID-19), multiple

thromboinflammatory events contribute to the pathophysiology, including coagulation system activation, suppressed fibrinolysis, vascular endothelial cell injury, and prothrombotic alterations in immune cells such as macrophages and neutrophils [7]. Although thrombocytopenia is not an initial presentation as an infectious coagulopathy, recent studies have demonstrated the vital role of platelets in COVID-19-associated coagulopathy SARS-CoV-2 and its spike protein have been known to directly or indirectly promote release of prothrombotic and inflammatory mediators that lead to COVID-19-associated coagulopathy. Although clinical features of vaccine-induced immune thrombotic thrombocytopenia include uncommon locations of thrombosis, including cerebral venous sinus, we speculate coronavirus spike proteininitiatedprothrombotic pathways are involved in the pathogenesis of vaccineinduced immune thrombotic thrombocytopenia, as current evidence suggests that the spike protein is the promotor and other cofactors such as perturbed immune response and inflammatory reaction enhance the production of antiplatelet factor 4 antibody [8].

Materials and Methods

This is a case control study was conduct in Khartoum state during the period of two months Jun 2021 - December 2021, blood sample was collected from 50 0Sudanese vaccinated by AstraZeneca vaccine and 500 normal controls. 2.5 ml of venous blood samples was collected by syringes in Trisodium citrate container from individuals that vaccinated by AstraZeneca covid-19 vaccine and non-vaccinated. Each blood sample will be centrifuge in 2000 and measured by coagulometer and results will be recorded.

Methodology

Principle of Coagulometer: Based on the clotting method using a monitoring ball and magnetic transducers. The coagulometer consists of a recording unit and a unit of a thermostatic switch and a ball dosing apparatus. The device may operate off-line or may be connected to a personal computer.

Procedure: Activated partial thromboplastin time (APTT): Citrated plasma, an activating agent, and phospholipid are added together and incubated at 37°C In water Bath. Calcium is added, and the time necessary for the clumping of kaolin is measured. The normal time is usually reported as less than 30 to 35 seconds depending on the technique used. In fact, there is a normal range of about 10 seconds (e.g., 25 to 35), and decreased values ("short") may also be abnormal. Prothrombin time (PT): Citrated plasma and an activating agent (usually thromboplastin extracted from animal brain) are incubated at 37°C In water Bath. The plasma is recalcified and the time is measured until fibrin filaments are observed. Each laboratory has its own normal value, usually between 12 and 15 seconds.

Results

2.5ml of sample among 500 individual in this study, collected from gender, male and female, 500 cases vaccinated and 500 as control no vaccinated. This study appears statistically significant different between case and control in PT, APTT, INR is P value (0.004) (0.000) (0.012) respectively. Table (1).There is statistically significant different in PT and APTT among male and female, P value (0.036), (0.001) respectively and insignificant in INR P value (0.138). Table (2). This study shows insignificant correlation with duration of vaccine and PT, APTT and INR, P value (0.488) (0.614) (0.479) respectively and no significant correlation between age and study parameters, PT, APTT and INR is P value (0.317) (0.071) (0.270) respectively. Table (3)

Table 1: Mane of Clotting Profile in Individuals Vaccinated with Covid-19 Astrazeneca Vaccine Compared to Control

Clotting profile	Mean±SD Case	Mean±SD Control	P value
PT/seconds	14.6±2.03	13.6±1.36	0.004^{S}
APTT/seconds	26.13±4.98	33.37±7.23	0.000^{S}
INR	1.07±0.145	1.01±0.087	0.012^{S}

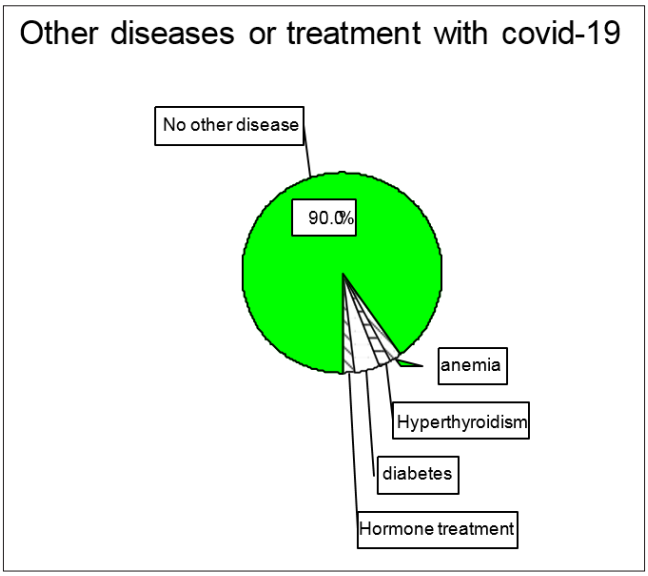
Table 2: Mean of Clotting Profile in Individuals Vaccinated with Covid-19 Astrazeneca Vaccines According to Gender

Clotting profile	Mean±SD Male	Mean±SD Female	P value
PT/seconds	13.7±1.62	14.5±1.90	0.036^{S}
APTT/seconds	31.96±7.85	27.35±5.49	0.001^{S}
INR	1.02±0.111	1.06±0.133	0.138^{NS}

Table 3: Correlation of clotting profile with duration of vaccines and age

Clotting profile	Duration	P value	Age	P value
	R/Pearson		R/Pearson	
PT/seconds	0.100	0.488NS	-0.101	0.317NS
APTT/ seconds	0.073	0.614NS	-0.182	0.071NS
INR	0.103	0.479NS	0.111	0.270NS

Figure 1



- Other disease and treatments beside the covid-19 vaccines

Discussion

The corona virus disease 2019 (COVID-19) pandemic caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) is the most formidable challenge to humanity in a century. It is widely believed that prepandemic normalcy will never return until a safe and effective vaccine strategy becomes available and a global vaccination programmed is implemented successfully. Our study agreed with study done in UK by Paul H and Maxime T who found that the coagulation profile PT and APTT significantly Prolonged after covid-19 vaccine by about 30% 9. Our study disagreed with another study done by flera P and Armando T (2021) show no modifications of the coagulation parameter after vaccinated by AstraZeneca covid-19 vaccine10.

Declarations

Ethical approval and consent to participant:

Approval of This study was obtained from hematology department of medical laboratory science (MLS) , Elrazi University ,and ministry of health issued by the local ethical committee , Khartoum State, Sudan . Written consent was taken from each member of the study .

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated during and / or analyzed in this study are not publicly available due to Khartoum vaccinate ethical policy in order to protect participant confidentiality.

Competing interest

The authors declare that they have no competing interests .

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Authors contributions

AH and AHO,DS,MA,NW,SA and WA contributed in literature search and manuscript writing. AH had the main idea of the study and contributed in manuscript writing ,AHO,DS,MA,NW,SA and WA contributed to clinic work , AH contributed in statistical analysis. AH supervised the study and critically reviewed the manuscript. All authors read and approved the final draft of the manuscript.

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