



CLARIFYING THE EFFECT OF STATINS ON COAGULATION PARAMETERS IN THE JORDANIAN ROYAL MEDICAL SERVICES INTENSIVE CARE UNITS PATIENTS – A MULTICENTER STUDY

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ABSTRACT

Introduction: Statin drugs are frequently prescribed to treat hyperlipidemia and lower the risk of cardiovascular disease. However, particularly in patients who are critically ill, there is a rising interest in their possible impact on coagulation parameters. In order to identify potential consequences for clinical practice, this study examines the connection between statin medication and coagulation parameters in patients admitted to the Jordanian Royal Medical Services (JRMS) and seeking to understand the potential implications for clinical practice.

Objective: The main objective of this research is to evaluate how statin therapy, Atorvastatin and Simvastatin medication, in particular, affect coagulation markers in a cohort of Jordanian patients. We aim to determine if there are any notable trends in the Prothrombin Time (PT) and International Normalized Ratio (INR) values linked to the usage of statins. Providing valuable information on the safety and clinical implications of these drugs in this patient population.

Methodology: In this study we will conduct a retrospective analysis of medical records on Hakeem Health System used in JRMS for patients from multiple ICUs within the JRMS. The study population will include patients who were admitted to these ICUs and received statin therapy (Atorvastatin or Simvastatin) during their hospitalization. Coagulation parameters (PT and INR) for 33 patients will be obtained and analyzed and simple statistical analysis will be conducted to determine if there is any effect on coagulation parameters and to which extent.

KEYWORDS: Statins, Atorvastatin, Simvastatin, Coagulation Parameters, Prothrombin Time, PT, International Normalized Ratio, INR, Jordanian Royal Medical Services, Intensive Care Units, ICU.

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1. INTRODUCTION:

Cardiovascular disease (CVD) continues to be a serious worldwide health issue, dramatically raising morbidity and mortality rates in a variety of communities and in the continued search for efficient preventative and management measures statin (a class of medications known for their effectiveness, to lower low-density lipoprotein cholesterol levels and, as a result, lessen the risk of atherosclerotic cardiovascular events.) have been found to be an effective treatment choice for managing hyperlipidemia, a significant risk factor for CVD [1,2,3].

However, as statin prescriptions have increased, particularly in the context of critically ill patients there is a growing interest in understanding statins possible effects on coagulation parameters, a crucial component of overall health and wellbeing since the clinical practice heavily relies on coagulation measures, which include indicators like the Prothrombin Time (PT) and International Normalized Ratio (INR). These factors play a crucial role in maintaining the delicate balance between preventing excessive bleeding and avoiding potentially fatal thrombotic episodes, therefore they are essential in determining a patient's blood clotting capacity [4,5,9].

A disturbance of these coagulation markers can have significant effects on patient outcomes. These

characteristics could increase the risk of bleeding problems, which could result in serious hemorrhages if they are very prolonged. On the other hand, if the parameters are excessively reduced, it may increase the risk of thrombotic events including strokes and deep vein thrombosis, which can potentially be life-threatening [10,11]. It is critical to comprehend the intricate interactions between statin medication and these coagulation markers because they could affect the safety and overall effectiveness of statin therapy in a patient group where cardiovascular and coagulation problems frequently coexist.

We started this multicenter study to examine the connection between statin therapy and the coagulation parameters of patients admitted to the Jordanian Royal Medical Services (JRMS) intensive care units (ICUs), with a focus on the frequently prescribed statin medications (Atorvastatin and Simvastatin). The purpose of the study is to investigate if the use of these statins in the context of critical care affects coagulation parameters PT, INR, in particular, with the ultimate aim to improve patient safety.

Table 1: The impacts of atorvastatin and simvastatin on coagulation parameters

Atorvastatin				Simvastatin	
PT	INR	PT	INR	PT	INR
14.7	1.04	16.1	1.15	15.5	1.15
16.4	1.22	20.5	1.51	53.1	4.15
15.5	1.15	15.8	1.18	82.2	6.67
13.6	1.22	13.6	1.01	14.8	1.1
19	1.42	14.8	1.1	17.4	1.31
22.7	1.73	15.5	1.15	13.8	1.03
14.7	1.05	14.7	1.13	15.4	1.1
119.7	9.68	15.4	1.16	17.3	1.29
15.9	1.19	13.4	0.99	66.1	5.06
17	1.27	14.7	1.09	15.4	1.15
16.4	1.24	15.5	1.2	15.9	1.19

2. METHOD:

A. **Study Design:** This study is a retrospective multicenter study using medical records obtained from the Hakeem Health System, which is the electronic health record system used in JRMS. The study will involve patients admitted to multiple ICUs in multiple centers within JRMS who are on regular statin therapy

in their treatment regimen and received statin therapy (Atorvastatin or Simvastatin) during their hospitalization.

B. **Study Population:** Study population is comprised of patients from various ICUs within JRMS who meet the following criteria: (1) Admitted to an ICU in JRMS. (2) On regular Atorvastatin or Simvastatin therapy

and received it during their hospitalization. (3) Availability of coagulation parameters (PT and INR) data during hospitalization.

C. Data Collection and Analysis: 33 patients, 22 of whom were on atorvastatin and 11 of whom were taking simvastatin, had their data collected. Additionally, the research population's electronic health records were used to extract the coagulation parameters, including the PT and INR values for those patients (Table 1). Simple statistical analysis was conducted to assess if there is any

significant effect of statins on coagulation parameters. And subgroup analysis was also used to identify any changes based on the type of statin (Atorvastatin vs. Simvastatin).

3. RESULTS:

Data analysis from the study population showed an elevated average PT values of 23.71 Seconds; Normal value: 11-13.5 Seconds with a range of 13.40-119.70 Seconds, and an elevated average INR values of 1.82; Normal range: 0.8-1.1 with a range of 0.99-9.68 (Table 2).

Table 2: The values of PT and INR among study participants

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
PT	33	13.40	119.70	23.7121	23.16641
INR	33	.99	9.68	1.8206	1.88245
Valid N (list wise)	33				

Subgroup analysis revealed significant variability in coagulation parameters: with a variability in PT and INR values observed among patients taking Atorvastatin. PT values ranged from 13.40 to

119.70, with an average PT value of 20.71. INR values ranged from 0.99 to 9.68, with an average INR value of 1.59 (Table 3).

Table 3: Atorvastatin Group Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PT	22	13.40	119.70	20.7091	22.22069
INR	22	.99	9.68	1.5855	1.81580
Valid N (list wise)	22				

Patients taking Simvastatin also exhibited a wide range of PT and INR values, indicating Substantial variability. PT values ranged from 13.80 to 82.20, with an average PT value of 29.72. INR values for

Simvastatin ranged from 1.03 to 6.67, with an average INR value of 2.29 (Table 4), demonstrating a more pronounced impact on coagulation parameters with higher INR and PT values.

Table 4: Simvastatin Group Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PT	11	13.80	82.20	29.7182	24.91926
INR	11	1.03	6.67	2.2909	2.01262
Valid N (list wise)	11				

4. DISCUSSION:

According to the findings of our investigation, it is clear that there is a significant impact on coagulation reflected by the study population's PT and INR values. The analysis of our data showed that the average PT and INR values across the entire research cohort were noticeably higher than normal. Showing a significant delay in the coagulation process and suggest a higher risk of bleeding. The findings are noteworthy because they imply that statin medication may be associated with coagulation impairment^[4,12]. As a result, it's critical for medical providers to exercise caution when recommending statins to patients who have a history of bleeding issues or who are using coagulation-altering medicines and it may be crucial to monitor the coagulation parameters in these patients.

Subgroup analysis of the study population revealed significant variation in PT and INR values, with more pronounced impact on coagulation parameters in the case of Simvastatin patient group^[6,13]. This is indicative of the highly variable responses to statins in terms of their effect on coagulation parameters. Making it a necessity to

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conduct further studies to determine whether various statins medications affect coagulation parameters differently.

Our research shows how crucial it is to take coagulation factors into account when prescribing statins. Medical professionals also should use caution and keep a close eye on their patients when initiating or adjusting statin therapy, especially those who are more susceptible to bleeding.

5. CONCLUSIONS:

This study highlights the need of taking into account coagulation markers when statins are prescribed since understanding the effect of statins, especially Simvastatin, on coagulation parameters is important to ensuring the safety of patients and optimizing medical treatment, particularly in critical care settings. Caution is necessary, especially with patients exhibiting extreme values to minimize any negative effects on coagulation markers^[7,8].

Limitations of the Study: This study has some drawbacks particularly due to its limited sample size and further studies with larger sample size are advised.

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