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PLATELET COUNT AND INDICES IN HYPERTENSION AMONG SUDANESE PATIENTS

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ABSTRACT

Hypertension, a leading contributor to cardiovascular morbidity and mortality, is on the rise in Sudan, exacerbated by delayed diagnosis and limited access to healthcare. Platelet count and platelet indices—such as mean platelet volume (MPV), platelet distribution width (PDW), and plateletcrit (PCT)—have emerged as potential biomarkers for hypertension-related risks. This review evaluates the significance of platelet count and indices in hypertensive Sudanese patients, exploring their relationship with disease progression and cardiovascular risk. Platelets, central to clot formation, also play a key role in endothelial dysfunction and inflammation, both of which are implicated in hypertension. Studies in Sudanese hypertensive patients suggest variability in platelet count, with some demonstrating increased counts due to heightened platelet activation. Elevated MPV and PDW levels have been correlated with uncontrolled hypertension, indicating a higher thrombotic risk and potential for early vascular damage in these patients. The role of PCT remains less established but shows promise as a cardiovascular risk marker. Incorporating platelet indices into hypertension management could significantly improve early detection and treatment outcomes in resource-limited settings like Sudan, where advanced diagnostic tools are scarce. By monitoring these indices, healthcare providers can better stratify patients by risk, particularly those vulnerable to severe complications such as stroke or myocardial infarction. Further research is essential to validate the clinical utility of these markers, but current evidence supports their integration into routine practice for the Sudanese hypertensive population, where early intervention is crucial in preventing cardiovascular events.

INTRODUCTION

Hypertension, a leading cause of cardiovascular morbidity and mortality worldwide, is becoming increasingly prevalent in developing countries, including Sudan. In Sudan, the burden of hypertension is exacerbated by limited access to healthcare and late diagnosis, contributing to the rise in cardiovascular complications. In recent years, platelet count and platelet indices—such as mean platelet volume (MPV), platelet distribution width (PDW), and plateletcrit (PCT)—have gained attention as potential biomarkers for hypertension-related risks. This review focuses on the significance of platelet count and indices in hypertensive Sudanese patients, examining their role in disease progression and cardiovascular risk assessment.

Platelets and Hypertension Pathophysiology

Platelets are essential components of the circulatory system, primarily involved in clot formation and wound healing. However, their role extends beyond coagulation, as they contribute to inflammatory responses and endothelial dysfunction, both of which are central to hypertension pathogenesis (Eltahir & Ibrahim, 2024). Platelet activation is a key event in hypertension, promoting vascular injury and atherosclerosis, leading to higher cardiovascular risks, particularly in populations with uncontrolled hypertension, such as those in Sudan.

Platelet Count in Hypertensive Sudanese Patients

Studies in hypertensive populations, including those in Sudan, have shown varying results regarding platelet counts. Some evidence suggests that hypertensive patients exhibit elevated platelet counts, reflecting increased platelet turnover and activation (Ahmed et al., 2019). In the Sudanese context, Eltahir and Ibrahim (2024) observed that hypertensive patients in urban centers had slightly higher platelet counts compared to normotensive controls, although the difference was not always statistically significant.

This variability might be attributed to several factors, including genetic predispositions, environmental influences, and the duration or severity of hypertension. The high prevalence of undiagnosed or poorly managed hypertension in Sudan could explain these findings, as chronic hypertension often leads to vascular damage, activating platelets and potentially altering platelet count.

Platelet Indices in Sudanese Hypertensive Patients

1. Mean Platelet Volume (MPV)

MPV, an indicator of platelet size, has been linked to platelet reactivity and activation. In hypertensive patients, including those in Sudan, elevated MPV levels have been reported as markers of increased thrombotic risk (Eltahir & Ibrahim, 2024). A study by Musa et al. (2020) demonstrated that Sudanese patients with uncontrolled hypertension had significantly higher MPV values compared to those with controlled hypertension, suggesting a strong association between platelet activation and blood pressure regulation.

2. Platelet Distribution Width (PDW)

PDW reflects the variability in platelet size, which is indicative of platelet activation. Sudanese hypertensive patients, particularly those with severe or long-standing hypertension, were found to have higher PDW levels compared to normotensive individuals (Eltahir & Ibrahim, 2024). This suggests that PDW could serve as an early marker for vascular damage in this population, which is especially relevant given the late presentation of hypertensive complications in Sudanese clinical settings.

3. Plateletcrit (PCT)

Plateletcrit is a measure of the total platelet mass in the blood and is considered a comprehensive index reflecting both platelet count and size. Although studies focusing on PCT in hypertensive Sudanese patients are limited, preliminary data suggest that higher PCT levels may be associated with increased cardiovascular risk (Eltahir & Ibrahim, 2024). This highlights the need for further research to establish its role in risk stratification in Sudanese patients.

Clinical Implications in the Sudanese Context

Understanding the role of platelet count and indices in Sudanese hypertensive patients holds significant clinical potential. Early identification of hypertensive patients at risk for cardiovascular events using platelet indices could improve prognosis and guide treatment strategies. For instance, individuals with elevated MPV or PDW could be monitored more closely for complications such as stroke or myocardial infarction, which are common outcomes of poorly managed hypertension in Sudan (Eltahir & Ibrahim, 2024).

Moreover, these indices could serve as cost-effective tools in resource-limited settings like Sudan, where advanced diagnostic modalities are often inaccessible. Incorporating platelet

indices into routine hypertension management could allow for early intervention, especially in rural areas where healthcare access is limited.

CONCLUSION

Platelet count and indices, including MPV, PDW, and PCT, offer valuable insights into the pathophysiology and complications of hypertension, particularly in the Sudanese population. While further research is required to validate their clinical utility, existing evidence suggests that these markers could play a crucial role in early detection and risk assessment. Given the growing burden of hypertension in Sudan, incorporating platelet indices into routine clinical practice could improve outcomes and reduce the risk of cardiovascular events in this high-risk population.

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