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COMMENTARY

Higher Body Mass Index and Black Race Increase Risk of Rhabdomyolysis and Acute Kidney Injury After Trauma

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In the paper “Black Race and Body Mass Index are Risk Factors for Rhabdomyolysis and Acute Kidney Injury in Trauma,” the authors investigated body mass index (BMI) and race as risk factors for the development of rhabdomyolysis and acute kidney injury (AKI) in trauma patients. Their results showed that both higher BMI and black race were associated with a significantly increased risk for rhabdomyolysis and AKI after trauma [1].

Trauma is the leading cause of death in patients under the age of 45 and the overall fourth leading cause of death in the United States [2]. Therefore, clinical data analysis, in addition to basic science research, is essential to the overall improvement of mortality and morbidity in trauma patient populations. More specifically, research analyzing risk factors for poor outcomes after trauma can help physicians and nurses better prepare for certain types of patients. Several risk factors that increase mortality after trauma have already been identified. For example, one study published in the *Journal of the American College of Surgeons* showed that trauma patients with a BMI greater than or equal to 30 were 7.1 times more likely to die in the hospital compared to their non-obese counterparts. This was after they controlled for diabetes, gender, obesity, age, chronic obstructive pulmonary disease (COPD), and Injury Severity Score (ISS) [3]. Furthermore, studies investigating race showed that black trauma patients had worse outcomes than their white counterparts [1,4]. Multiple papers have also documented BMI and black race to be independent risk factors for AKI [1,5].

The paper “Black Race and Body Mass Index are Risk Factors for Rhabdomyolysis and Acute

Kidney Injury in Trauma” investigated two important and severe complications as listed in the title [1]. AKI is a potentially fatal condition that can develop in about 1–25% of intensive care unit patients, and it is often associated with increased mortality. The cause of post-traumatic AKI is not well documented; some publications suggest that decreased renal perfusion is the main cause, while others propose that it is caused by rhabdomyolysis [6]. Rhabdomyolysis is a condition where the rapid degradation of damaged or injured skeletal muscle tissue, often after trauma, releases various intracellular muscle components, potentially causing a host of life-threatening complications [7]. The mortality rate for rhabdomyolysis is approximately 10%, and is even higher for patients who subsequently develop AKI [8]. The seriousness of these complications only adds to the need to determine risk factors with the hope to better prevent and treat them.

It has previously been shown that blood pressure levels for African American have been increased compared to other races. As a result, African Americans have higher rates of stroke, end-stage renal disease, and congestive heart failure [9]. However, the authors found that black race was still a risk factor for rhabdomyolysis and AKI even after controlling for many variables including hypertension, end-stage renal disease, and heart failure.

The authors should be applauded in that they utilized the National Trauma Data Bank (NTDB) to its maximum potential. Impactful studies regarding rhabdomyolysis are limited. Many single-centers cannot sufficiently analyze these patients since the incidence is so low, but with the NTDB, the authors were able to analyze over 500 rhabdomyolysis

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patients, which are enough to make meaningful statistical conclusions [1]. Alternatively, a limitation of any study using BMI and the NTDB is that BMI is not always a perfect indicator of body fat and health. Since BMI is calculated based on a patient's height and weight, a very muscular individual could be falsely classified as obese using BMI. Better measurements of body fat could be waist circumference measurement and waist-to-height ratio; however, BMI was the best choice given the data they had access to [10].

Our institution has also been utilizing the NTDB to analyze mortality and major complications among different BMI categories. In agreement with the authors, we found that patients with higher BMI were more at risk for many of the complications recorded by the NTDB. It was also evident that patients with an underweight BMI had more complications than those with a normal BMI (unpublished observations). However, the authors of the above mentioned study did not find underweight BMI to be a risk factor for rhabdomyolysis or AKI after controlling for other variables [1].

Knowledge of risk factors for these conditions (AKI and rhabdomyolysis) is vital for better diagnosis and treatments. Clinically, the triad of symptoms used to diagnose rhabdomyolysis is muscle pain, weakness, and myoglobinuria (presented as brown discoloration of urine). However, the triad is exhibited in less than 10% of rhabdomyolysis patients and some of those patients do not even report muscle fatigue or pain. In turn, diagnosing rhabdomyolysis is not always straightforward [7,8]. Torres et al. recommend physicians to be suspicious of rhabdomyolysis in patients with risk factors such as crushing injuries, sepsis, muscular disease, and immobilization [7]. As a result of this paper, physicians should also be suspicious of rhabdomyolysis in trauma patients with a high BMI, black race, or the combination of both.

Diagnostic testing for rhabdomyolysis is done by measurement of creatine kinase (CK) levels, an easy and relatively inexpensive test [7,8]. It may be of interest to measure CK levels in all patients with certain or multiple risk factors for rhabdomyolysis. Although each test comes with a slight cost, it may outweigh all the costs associated with a later diagnosis of rhabdomyolysis and acute kidney injury. The earlier the diagnosis of rhabdomyolysis, the earlier the patients will be given treatments to prevent AKI and, therefore, they would have a better chance of not developing AKI.

Future studies should compare all the risk factors of rhabdomyolysis, such as trauma, sepsis, muscular disease, immobilization, and now black race

and high BMI, and determine which are most significantly associated with rhabdomyolysis [1]. A model or scoring system could be developed to determine which patients should have their CK levels measured and which should not have their CK levels measured. Furthermore, investigating the effects of nutritional status, albumin levels, and drug and alcohol use on AKI and rhabdomyolysis could help determine more risk factors. In addition to recommendations for diagnosing patients, it is important for the general public to know that obesity is not just a risk factor for metabolic and cardiovascular diseases, but it is also a risk factor for many complications after trauma [1,5].

DECLARATION OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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