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Letter to Editor

Burn Patients and Augmented Renal Clearance: An Important but Neglected Issue

Farzan Madadizadeh Ph.D., Golnaz Afzal * Ph.D.

Clinical Pharmacy Department, School of Pharmacy, Shahid Sadoughi University of Medical Science, Yazd, Iran

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Dear Editor,

Patients suffering from major burn injuries represent a unique population of critically ill individuals. An immune and inflammatory response, metabolic changes, and subsequent hypermetabolism accompany them [1]. These conditions can be challenging to manage and may lead to multiple organ failure, affecting various organs such as the heart, liver, and kidneys [2]. The renal failure that occurs in extensively burned patients is typically linked to the failure or dysfunction of other organs, manifesting as multiple organ dysfunction syndrome, which negatively impacts the prognosis [3]. On the other hand, physiological and metabolic changes resulting from burn injuries can impact pharmacokinetic parameters [4]. It can lead to larger volumes of distribution, faster hepatic metabolism, and increased renal clearance [5]. The idea of enhanced renal function and accelerated medication clearance after a major burn injury has been documented as far back as the 1970s [6]. Over time, patients with severe burn injuries have been found to experience an increase in renal clearance, known as augmented renal clearance (ARC). This term, relatively new, typically refers to a creatinine clearance (CrCl) exceeding 130 mL/min/1.73 m^2 in men or 120 mL/min/1.73 m^2 in women, as determined through timed urine collection spanning 8 to 24 hours [7].

***Corresponding Author:** Clinical Pharmacy Department, School of Pharmacy, Shahid Sadoughi University of Medical Science, Yazd, Iran. **Email:** dr.golnaz.afzal@gmail.com

The phenomenon of accelerated renal clearance is characterized by the rapid elimination of circulating solutes and medications [8]. This can potentially lead to renally cleared antibiotics being at risk of below therapeutic concentrations, ultimately putting patients at risk of invasive infections, mortality, treatment failure, and worse clinical outcomes [9]. The prevalence of ARC is estimated to be as high as 70% in critically ill patients, particularly in conditions such as trauma and burns associated with various stress factors [10].

Therefore, understanding and monitoring ARC in burn patients is crucial for optimizing medication dosing and preventing potential complications, ensuring effective and safe pharmacotherapy. Furthermore, the importance of special attention to ARC in burn patients is outlined as follows.

Patients with a larger total body surface area (TBSA), younger age (typically under 50 years), male sex, apparently normal renal function, and lower incidence of organ failure have a well-documented risk of ARC [11, 12].

Currently, there is no ideal substitute indicator or assessment tool available for assessing ARC in burn patients, which poses a significant clinical challenge in detecting and managing this condition [11]. Although measuring urine CrCl is a more accurate method of determination, the measurements are typically limited to the first few days following the burn occurrence [13].

Normal serum creatinine levels may indicate under-recognized ARC, while the use of standard antibiotic dosage regimens is likely to lead to suboptimal concentrations, inferior clinical outcomes, the emergence of multidrug-resistant bacteria, and increased costs for patients and the community [11].

Acute kidney injury occurred in 38% of burn patients, which is more likely to happen in the elderly [14]. The prevalence of ARC was 70.6%, with an incidence of 66.3%, which is more common in younger age groups [15]. Here are two main outcome summaries, as demonstrated in Table 1.

Table 1. Renal dysfunction in burn patients

Type of renal dysfunction	Risk factor	The overall prevalence in the world
Acute kidney injury	Elderly, previous chronic disease [14]	38% [14]
Augmented renal clearance	Young age, apparently normal renal function [11], lower organ failure [12]	70.6% [15]

In essence, while renal injury in burn patients is well-studied, ARC is another crucial aspect that requires attention. Limited data exists on ARC in burn patients; however, it is particularly prevalent in younger individuals, especially males with significant total TBSA involvement. Given this risk factor, clinicians should be vigilant and consider adjusting dosages upward to improve treatment outcomes. Additionally, healthcare providers must be cautious about the wide spectrum of renal function changes that may occur when caring for burn patients.

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