Current Research in Diabetes & Obesity Journal
ISSN: 2476-1435

Juniper Publishers
key to the Researchers

Mini Review
Volume 8 Issue 3 - August 2018
DOI: 10.19080/CRDOJ.2018.08.555736

Curre Res Diabetes & Obes J

Comparison of Albumin Levels in Patients with and without Type 2 Diabetes on Maintenance Hemodialysis

Hector E. Hernandez, Ph.D., Zin Htway, Ph.D. and Jeffrey S. Tyer, BSN, RN, CNN

University of Texas, USA

Submission: July 16, 2018; **Published:** August 21, 2018

***Corresponding author:** Hector Hernandez E, University of Texas, San Antonio, Texas, United States, Email: dr.eddiehernandez@gmail.com

Introduction

Albumin is a ubiquitous protein found in blood plasma. Its ubiquity readily provides the body with the protein necessary for growth maintenance and tissue repair and supports oncotic blood pressure and hemodynamics Brin et al. [1]. For patients undergoing hemodialysis treatments, albumin found in the blood aids with fluid removal by drawing excess fluid from edematous tissues back into the blood, where it can then be removed by a dialyzer Fresenius Medical Care [2]. Because of their disease, patients with a Type 2 diabetes mellitus diagnosis suffer from renal dysfunctions ranging from renal insufficiencies to chronic renal failure due to the kidney's compromised ability to filter albumin. The greater the severity of the renal disease, the greater the albumin declinations found in the blood plasma and hence the greater the degree of albuminuria Stoian et al. [3].

As the most abundant plasma protein, albumin is largely responsible for colloid osmotic pressure. From a physiological perspective, the protein pulls water into the circulatory system through the capillaries, maintaining homeostatic blood pressure. A reduction of albumin in plasma, therefore, can cause a decrease in colloid osmotic pressure and subsequently tissue edema Ahren et al. [4]. The physiological functions of albumin, including blood pressure regulation, is abundant in the literature; what are not clear is how and to what degree albumin levels are affected in patients with a Type 2 diabetes diagnosis and how these potential differences might influence blood pressure and renal disease. Additionally, and more specifically, it has not been ascertained how and to what magnitude albumin levels are affected in patients with Type 2 diabetes undergoing hemodialysis therapy compared to patients with an alternative diagnosis. Another important consideration is that the health management of Hispanics requiring hemodialysis is often a generalized "one-size-fits-all" approach because there is a paucity of published literature that clearly defines policies for specific ethnic populations Hernandez et al. [5]. This study aimed to pursue this research gap.

According to Chukwueke et al. [6], an estimated 17.5 million people in the United States were diagnosed with either Type 1 or Type 2 diabetes in 2007. In the same year, it was the leading cause of blindness in people between the ages 20 and 74 years and of end-stage renal disease (ESRD) in Hispanic Americans Chukwueke et al. [6]. Furthermore, the financial burden of diabetes is high and increasing every year. The reasons for this burden have largely been attributed to people with diabetes having a predisposition for disease sequelae, including cardiovascular and renal disease. These important statistics served to underscore the urgency to conduct the investigation.

The primary objective for this clinical, retrospective investigation was to determine the relationship between albumin levels in Hispanic patients on maintenance hemodialysis with Type 2 diabetes mellitus and to determine if any potential differences existed over time. Although the relationship between the dependent variable, albumin, and the independent variable, Type 2 diabetes mellitus is well established in the literature, potential albumin level differences in these patients has not been studied to date.

Renal physiology

Albumin provides the body with the scaffolding vital for tissue growth and repair, oncotic pressure maintenance, and hemodynamics. For patients on maintenance hemodialysis, circulating albumin aids with fluid removal by drawing extra fluid from edematous tissues back into the blood where it can then be subsequently extracted via hemodialysis. In patients with Type 2 diabetes, the hyperglycemia exhausts the filtration system of the kidney, progressively damaging the glomeruli. The glomerular damage allows albumin to seep into the urine,

thus lowering albumin levels in the blood. In addition to the hypotensive effects provoked by the constant albumin loss, over time this can cause irreparable kidney damage in some cases.

Results

The physiological importance of albumin is abundant in the literature; how and to what magnitude albumin levels are affected in patients with Type 2 diabetes is unclear. This study employed various statistical and computational analyses to evaluate potential associations between the research variables. In addition to the variables of interest, covariables were appropriately controlled using logistic regression analysis. The results showed significant differences between groups and albumin levels at the first two intervals and disparate improvement trends post treatment initiation (Baseline 1.29±0.49mg/dL, F = 2.28, p<.032; 3 months 0.47±0.41mg/dL, F = 1.62, p<.004). Predictors known to lower albumin levels showed inconclusive results.

The albumin level patterns seen at 3 different intervals are summarized in (Figure 1). The separation between the diabetic group (blue) and the non-diabetic group (red) at the CMS and 0-month interval confirms the results of the repeated measures t-tests. Also, in alignment with the repeated measures t-test, the latter intervals of 3 and 6 months show trend lines demonstrating similar improvement trends. Both trend lines gradually approach each other and plateau at the 6-month time interval, suggesting that improvement trends in the diabetic group were normalizing faster to reach normoalbuminemic levels like the non-diabetic group.

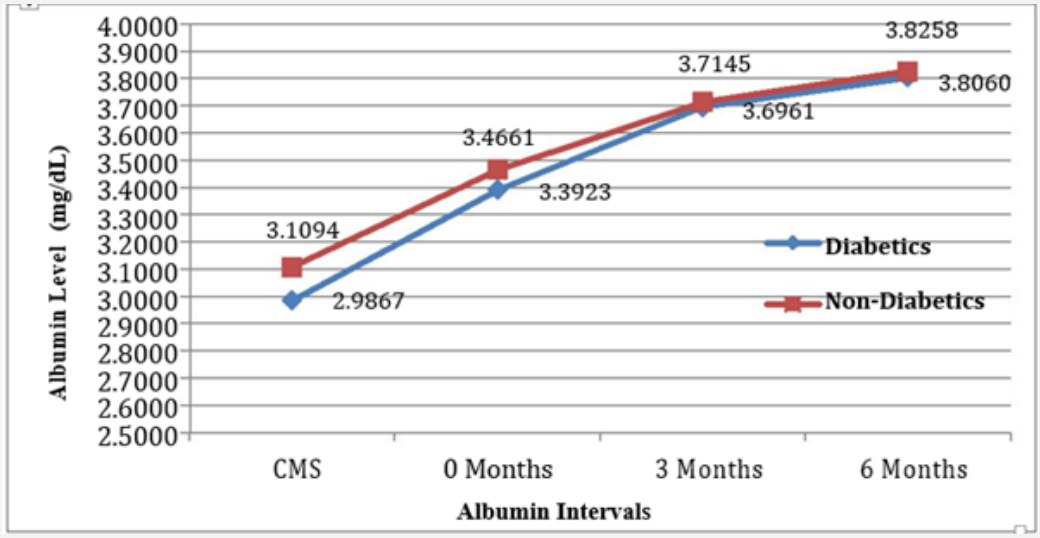

Figure 1: Albumin Level Differences Between Diabetic and Non-Diabetics. CMS is Centers for Medicare and Medicaid Services.

Conclusion

This study was designed to investigate the potential association between serum albumin levels, Type 2 diabetes, and associated covariables. Furthermore, trends seen from treatment onset through the course of patient dialysis treatments were also investigated. The results showed that differences exist in albumin levels from treatment onset through the course of their treatment. Type 2 diabetes confirmatively showed differences inalbumin levels compared to the non-diabetic comparison group. Albumin level differences are seen at 4 different time intervals within each group. Furthermore, appreciable differences were notable between both diabetic and non-diabetic groups. From this study, it can also be concluded that Type 2 diabetes was influential in modulating albumin levels in a statistically significant way. And, when known predictors such as a history of hypertension, peripheral vascular disease, and the development of an infection or inflammatory response were considered during analysis, albumin levels followed similar improvement trends and were therefore not significantly influenced in this sample population. The outcomes of this study may help identify disease-specific albumin trends that could influence the course of diseases such as diabetes and renal disease so that ethnic-specific care can be developed for Hispanic patients undergoing maintenance hemodialysis.

References

1. Brin H, Christensen E (2006) Renal albumin absorption in physiology and pathology. Kidney International 69(3): 440-449.
2. Fresenius Medical Care (2013) What is dialysis?
3. Stoian M, Stoica V, Radulian G (2012) Albuminuria-marker of progressive renal disease. Journal of Medicine and Life 5(4): 420-422.
4. Ahren B, Burke B (2012) Using albumin to improve the therapeutic properties of diabetes treatments. Diabetes, Obesity and Metabolism 14(2): 121-129.
5. Hernandez HE, Htway Z, Eichner A (2016) Baseline Anemia of Hispanic Dialysis Patients with and without Type 2 Diabetes. Journal of Molecular Histology and Medical Physiology 1: 105.
6. Chukwueke I, Cordero-MacIntyre Z (2010) Overview of type 2 diabetes in Hispanic Americans. International Journal of Body Composition Research 8(Supp): 77-81.

How to cite this article: Hector Hernandez E, Zin Htway, Jeffrey Tyer. Comparison of Albumin Levels in Patients with and without Type 2 Diabetes on Maintenance Hemodialysis. Curre Res Diabetes & Obes J. 2018; 8(3): 555736. DOI: 10.19080/CRDOJ.2018.08.555736

DOI: 10.19080/CRDOJ.2018.08.555736

How to cite this article: Hector Hernandez E, Zin Htway, Jeffrey Tyer. Comparison of Albumin Levels in Patients with and without Type 2 Diabetes on Maintenance Hemodialysis. Curre Res Diabetes & Obes J. 2018; 8(3): 555736. DOI: 10.19080/CRDOJ.2018.08.555736