

Hypoglycemia-Induced Loss of Consciousness in an Immobilized Geriatric Patient: A Case Report

Muhammad Ibtisam Fauzani¹, Vebriyanti Wahyu Handayani²

¹ General Practitioner, Bendan Regional Hospital, Pekalongan City, Indonesia

² Internal Medicine, Bendan Regional Hospital, Pekalongan City, Indonesia

ABSTRACT

Introduction : Hypoglycemia in geriatric people is a less well recognized condition and have been correlated with acute outcomes such as seizure, coma, and cardiac arrhythmia. Symptoms of hypoglycemia tend to be less specific with ageing, where diagnosing these conditions in geriatric patient potentially becomes more difficult.

Case Report : A 77-year-old man was brought to the ER due to unresponsive since 2 hours before admission. He was hypoglycemic with a plasma glucose level of 70 mg/dL, hypoalbuminemia (2.6 g/dL), and hyponatremia (121 mmol/L). After receiving intravenous dextrose, he regained consciousness and his plasma glucose level increased to 120 mg/dL. Electrolyte abnormalities were corrected, plasma glucose level monitored every 2 hours and titrated according to hypoglycemia standard procedure. He has been in total bed rest and immobilized for 5 years due to inferior paraparesis with decubitus ulcer, had a history of uncontrolled hypertension and diabetes mellitus. Physical examination showed reduced motor function in his lower extremities. The patient had significant recovery during the treatment course and was discharge 4 days after initial presentation.

Discussion : Hypoglycemia is a low plasma glucose concentration state that could leads to defective glucose counter-regulation and hypoglycemia unawareness. The patient's long immobilized state potentially leads to a catabolic state that results in muscle wasting. While his reduced intake leads to geriatric anorexia and become the potential cause of hypoglycemia. Mainstay of hypoglycemic treatment is the detection and treatment using interventions that rapidly increased blood sugar to a safe level, eliminating injury risks and quickly relived symptoms.

Conclusion : Diabetes in geriatric has a higher risk for hypoglycemia and should be considered in treating an elderly patient presenting with unresponsiveness or loss of consciousness.

KEYWORDS: Hypoglycemia, geriatric, immobilization, diabetes mellitus

ARTICLE DETAILS

Published On:
04 October 2024

Available on:
<https://ijpbms.com/>

I. INTRODUCTION

Hypoglycemia in geriatric people is a less well recognized condition, in which due to the limited number of clinical studies and lack of standardization in the diagnosis, is difficult to estimate the number of incidences. Hypoglycemia has been known as a common complication in patients with diabetes, mainly those treated with insulin, sulfonylurea, or glinide.¹ Studies have showed that geriatric population has the highest risk of hypoglycemia as a consequence of diabetes treatment among adults of all ages.² Although hypoglycemic condition is commonly mild or asymptomatic, but severe ones have been correlated with acute outcomes such as

seizure, coma, and cardiac arrhythmia. Symptoms of hypoglycemia tend to be less specific with ageing, where diagnosing these conditions in geriatric patient potentially becomes more difficult.³

Aging has also been associated with progressive physiological decline that happens across all body systems, which leads to a reduce ability to maintain homeostasis when faced with a stressor. This state often masked the clinical signs and symptoms of a disease in the geriatric population, making it challenging to distinguish pathologic and physiologic ageing.⁴ The aging proses has become the base of what we called geriatric giants, a term refers to chronic

Hypoglycemia-Induced Loss of Consciousness in an Immobilized Geriatric Patient: A Case Report

disabilities of senescence leading to adverse health outcomes, which consist of different components that can interact with each other and contributes to the incidence of geriatric cascade that turn old subject from robustness to disability.⁵ Conditions such as immobility, instability, incontinence, and cognitive impairment affects the geriatric population in a way that treating them requires a comprehensive and multidisciplinary approach.⁶ We report a case of hypoglycemia-induced loss of consciousness in an immobilized geriatric patient.

II. CASE REPORT

A 77-year-old man was brought to the ER by his family, who found him unresponsive since 2 hours before admission. He was hypoglycemic, with a plasma glucose level of 70 mg/dL, had hypoalbuminemia (2,6 g/dL) and hyponatremia (121 mmol/L). After receiving intravenous dextrose, he regained consciousness and his plasma glucose level increased to 120 mg/dL. His plasma glucose level was monitored per 2 hour, and were given dextrose 10% each time the level dropped between 80 – 100 mg/dL. His albumin was corrected with plasbumin 25%. History-taking revealed that the patient has been in total bed rest and immobilized for 5 years due to inferior paraparesis caused by a spinal disease which the detail was unknown by the patient. It was revealed that his food intake has become progressively decreased. He is allergic to clindamycin and cetirizine, and also had a history of uncontrolled hypertension and diabetes mellitus, and was revealed that he started taking glimepiride 2 times a day in the last 2 days prior admission.

Physical examination showed that the patient was tachycardic (140 beats per minute), and blood pressure was 153/91 mmHg, with no heart murmurs, normal auscultation of the lungs, and no peripheral edema. The abdominal examination revealed no masses and no tenderness. Neurologic evaluation of the extremities only showed muscle contraction and atrophy in both lower extremities and normal motoric function in the upper extremities. Ulcers was found in the patient's backside. Initial complete blood count showed that the patient was anemic (Hemoglobin 12,3 gr/d; Hematocrit 37,5%; Erythrocyte $4,23 \times 10^6$ /uL). Clinical chemistry revealed low albumin (2,6 g/dL), natrium (121 mmol/L), and chloride (92 mmol/L). There was no abnormality found in patient's chest radiography.

The electrolyte abnormalities were corrected and plasma glucose level was monitored every 2 hours during hospitalization period. The patient was consulted to a neurologist for his inferior paraparesis condition and were prescribed with mecobalamin and planned for physiotherapy. For his decubitus ulcer, the consulting surgeon advice for the usage of decubitus bed and wound care. The patient had significant recovery during the treatment course and was discharge 4 days after initial presentation.

III. DISCUSSION

Hypoglycemia is a low plasma glucose concentration state that could lead to the development of autonomic or neuroglycopenic symptoms and symptoms responding to the administration of carbohydrate. This condition most often found in people with type 1 diabetes and people with type 2 diabetes managed by insulin or sulfonylureas.⁷ In the geriatric population, hypoglycemic warning symptoms become less intense and often unrecognized. Hypoglycemia could decrease the body's normal responses to hypoglycemia, which leads to defective glucose counter-regulation and hypoglycemia unawareness. This alarming state occurs when the autonomic warning symptoms' threshold is close to or lower than the threshold for the neuroglycopenic symptoms, which make the first sign of hypoglycemia, like in this patient, is confusion or loss of consciousness.⁸ There are a few causes of hypoglycemia in people with diabetes, which in this case, we suspected due to decreased glucose intake and also increased insulin sensitivity. Advanced age alone is an independent risk factor for hypoglycemia. The prevalence of multiple chronic conditions increases with ageing, where studies found that 40% of geriatric population with diabetes also have four or more chronic conditions. Elderly people with multiple comorbidities also experienced higher risk of worsening or developing complications of underlying medical illness.⁹

Diabetes mellitus has been associated with other chemistry parameters in patients. In this case, we found that the patient had hyponatremia and hypoalbuminemia. Uncontrolled diabetes, like in our patient, could induce hypovolemic-hyponatremia due to osmotic diuresis.¹⁰ While low albumin level in patients with diabetes could be due to insulin deficiency, which leads to decreased albumin synthesis and secretion. Therefore, plasma protein glycation and glycosylated hemoglobin could be affected by the low level of albumin, which potentially makes it harder to monitor glycemic control.¹¹ Correcting this imbalance is an essential part in ensuring no complications arise in geriatric patients.

This patient has been immobilized for 5 years due to his neurological condition. Immobilization significantly increased the risk of paralysis, joint stiffness and pain, and also main metabolic alterations such as thromboembolic disease and insulin resistance, which ultimately results in impaired functional status. Studies showed that there is an interrelationship between muscle strength and ageing, in which accelerated loss of muscle strength is observed in geriatric with type 2 diabetes that increases the risk of functional limitations and physical disability.¹² Around 70% of adult diabetic patients has developed decrease muscle strength and lower muscle quality.¹³ Marmonti et al studied the impact of immobilization on the metabolic changes that occurs in rats with type 2 diabetes mellitus and showed that immobilized condition exhibits a glucose intolerance and increase insulin resistance due to reduce plasmatic adiponectin levels and a decrease in GLUT4 mRNA muscle

Hypoglycemia-Induced Loss of Consciousness in an Immobilized Geriatric Patient: A Case Report

expression, which is the one of the hallmarks of insulin resistance.¹⁴ Another geriatric giant that we found in this patient is anorexia of aging, where there is a loss of appetite and/or decreased food intake. Complex mechanisms are involved in the regulation of appetite, where a deterioration of specific activities in certain brain areas are thought to be the basis of this condition. Decreased food intake also leads to insufficient nutrient distribution in the body, resulting in lower energy production and potentially contributes to his immobile state.¹⁵

Treating hypoglycemia is centered around the detection and treatment of a low blood sugar level using interventions that could easily and rapidly increased blood sugar to a safe level, eliminating injury risks and quickly relived symptoms.¹⁶ The Indonesian Society for Endocrinology (*Perkumpulan Endokrinologi Indonesia* or PERKENI) recommended the administration of 50 mL 20% dextrose followed by D5% or D10% infusion. This patient was administered with 10% dextrose solution intravenously and his blood glucose level was found to be increase in concomitant with regained consciousness. Previous study by Kiefer et al proved that administrating D10% in the management of hypoglycemia had no short-term decay in blood glucose values¹⁷, while Yuriani et al showed that administrating intravenous D40% through infusion or bolus had no effect on the post-correction blood glucose response.¹⁸

CONCLUSIONS

Geriatric population with diabetes has a higher risk for hypoglycemia, which often unrecognized and were noticed once manifested clinically. Depleted blood glucose level should be one of the main etiologies considered in treating an elderly patient presenting with unresponsiveness or loss of consciousness, and a rapid treatment should be given to minimized the risk of worse and life-threatening outcome. Multiple chronic condition in an elderly patient underlined the need for multidisciplinary and individualized treatment approach.

REFERENCES

- I. Nakhleh A, Shehadeh N. Hypoglycemia in diabetes: An update on pathophysiology, treatment, and prevention. *World J Diabetes*. 2021;12(12):2036–49. doi:10.4239/wjd.v12.i12.2036
- II. Mordarska K, Godziejewska-Zawada M. Diabetes in the elderly. *Prz menopauzalny = Menopause Rev*. 2017 Jun;16(2):38–43. doi:10.5114/pm.2017.68589
- III. Abdelhafiz AH, Rodríguez-Mañas L, Morley JE, Sinclair AJ. Hypoglycemia in older people - A less well recognized risk factor for frailty. *Aging Dis*. 2015;6(2):156–67. doi:10.14336/AD.2014.0330
- IV. Preston J, Biddell B. The physiology of ageing and how these changes affect older people. *Med (United Kingdom)* [Internet]. 2021;49(1):1–5. doi:10.1016/j.mpmed.2020.10.011 Available from: <https://doi.org/10.1016/j.mpmed.2020.10.011>
- V. Badrkhahan SZ, Ala M, Fakhzadeh H, Yaghoobi A, Mirzamohamadi S, Arzaghi SM, et al. The prevalence and predictors of geriatric giants in community-dwelling older adults: a cross-sectional study from the Middle East. *Sci Rep* [Internet]. 2023;13(1):12401. doi:10.1038/s41598-023-39614-4 Available from: <https://doi.org/10.1038/s41598-023-39614-4>
- VI. Greenstein L, Abraham A, Tipping B. Treating complexity in the older adult - the role of the geriatric giants. *South African Fam Pract*. 2019 Dec 9;61. doi:10.4102/safp.v61i6.5065
- VII. Pettus JH, Zhou FL, Shepherd L, Preblick R, Hunt PR, Paranjape S, et al. Incidences of Severe Hypoglycemia and Diabetic Ketoacidosis and Prevalence of Microvascular Complications Stratified by Age and Glycemic Control in U.S. Adult Patients With Type 1 Diabetes: A Real-World Study. *Diabetes Care*. 2019 Dec;42(12):2220–7. doi:10.2337/dc19-0830
- VIII. Yale JF, Breay P, Senior PA. Hypoglycemia: Canada Clinical Practice Guidelines Expert Committee. *Can J Diabetes* [Internet]. 2018;42:S104–8. Available from: <https://doi.org/10.1016/j.cjcd.2017.10.007>
- IX. Wong CW. Avoiding hypoglycaemia: A new target of care for elderly diabetic patients. *Hong Kong Med J*. 2015;21(5):444–54. doi:10.12809/hkmj144494
- X. Liamis G, Liberopoulos E, Barkas F, Elisaf M. Diabetes mellitus and electrolyte disorders. *World J Clin cases*. 2014 Oct;2(10):488–96. doi:10.12998/wjcc.v2.i10.488
- XI. Brock F, Bettinelli LA, Dobner T, Stobbe JC, Pomatti G, Telles CT. Prevalence of hypoalbuminemia and nutritional issues in hospitalized elders. *Rev Lat Am Enfermagem*. 2016 Aug;24:e2736. doi:10.1590/1518-8345.0260.2736
- XII. NOMURA T, KAWAE T, KATAOKA H, IKEDA Y. Aging, physical activity, and diabetic complications related to loss of muscle strength in patients with type 2 diabetes. *Phys Ther Res*. 2018;21(2):33–8. doi:10.1298/ptr.r0002
- XIII. Rahimi M, Saadat P, Hosseini SR, Bayani MA, Bijani A. Muscle strength in diabetics compared to non-diabetic elderly subjects: A cross sectional and case-control study. *Casp J Intern Med*. 2019;10(3):265–70. doi:10.22088/cjim.10.3.265
- XIV. Marmonti E, Busquets S, Toledo M, Ricci M, Bria J, Oliva F, et al. Immobilization in diabetic rats results in altered glucose tolerance A model of reduced locomotion/activity in diabetes. *JCSM Rapid Commun* [Internet]. 2018 Jul 1;1(2):1–15. doi:<https://doi.org/10.1002/j.2617-1619.2018.tb00007.x> Available from:

Hypoglycemia-Induced Loss of Consciousness in an Immobilized Geriatric Patient: A Case Report

- <https://doi.org/10.1002/j.2617-1619.2018.tb00007.x>
- XV. Landi F, Calvani R, Tosato M, Martone AM, Ortolani E, Saveria G, et al. Anorexia of Aging: Risk Factors, Consequences, and Potential Treatments. *Nutrients*. 2016 Jan;8(2):69. doi:10.3390/nu8020069
- XVI. Sharifi Y, Ebrahimpur M, Tamehrizadeh SS. Hypoglycemic unawareness: challenges, triggers, and recommendations in patients with hypoglycemic unawareness: a case report. *J Med Case Rep [Internet]*. 2022;16(1):1–6. doi:10.1186/s13256-022-03498-1 Available from: <https://doi.org/10.1186/s13256-022-03498-1>
- XVII. Kiefer M V, Gene Hern H, Alter HJ, Barger JB. Dextrose 10% in the treatment of out-of-hospital hypoglycemia. *Prehosp Disaster Med*. 2014 Apr;29(2):190–4. doi:10.1017/S1049023X14000284
- XVIII. Yuriani Y, Andrajati R, Pramono LA. Comparison of Effects of The Hypoglycemia Management Protocol with 40% Dextrose Concentrated Solution to the Post-Correction Blood Sugar Response through Intravenous Infusion and Intravenous Bolus. *Indones J Clin Pharm*. 2019;8(2):99. doi:10.15416/ijcp.2019.8.2.99Nakhleh A, Shehadeh N. Hypoglycemia in diabetes: An update on pathophysiology, treatment, and prevention. *World J Diabetes*. 2021;12(12):2036–49. doi:10.4239/wjd.v12.i12.2036