INTRODUCTION

Neurological symptoms of hypoglycemia can be classified into two categories: adrenergic and neuroglycopenic. Adrenergic symptoms include: sweating, tremors, palpitations, and anxiety, while neuroglycopenic symptoms include: confusion, dizziness, headache, visual disturbances, and altered consciousness\(^1\).

Hypoglycemia is classified according to the American association of diabetes into three categories:

The glucose alert value for level 1, which is less than or equal to 70 mg/dL, denotes a glucose concentration low enough to necessitate the administration of fast-acting carbohydrate and adjustment of glucose-lowering therapy. Although this level indicates the need for intervention, it is not considered a severe or clinically significant hypoglycemic episode.

Clinically significant hypoglycemia at level 2 is defined as a glucose level lower than 54 mg/dL (3.0 mmol/L), which is indicative of a serious and clinically important hypoglycemic event that requires immediate attention.

Severe hypoglycemia at level 3 is not defined by a specific glucose threshold; instead, it is distinguished by hypoglycemia that causes severe cognitive impairment and necessitates external assistance for recovery\(^2\). Mild hypoglycemia may only cause mild confusion or headache, while severe or prolonged hypoglycemia can...
lead to seizures or coma\(^3\). The severity and duration of hypoglycemia can also impact the type and extent of neurological symptoms.

**Patient information**

A 38-year-old 80 kg, 155 cm long young female previously healthy who was fasting the first day of Ramadan was admitted to the Emergency department with a history of severe headache, which she described as the worst in her life, accompanied by dizziness and reactive asymmetric pupils. Clinical examination was within normal except for bilateral abducens palsy, horizontal nystagmus and photophobia. The informed consent was taken from the patient.

**Diagnostic assessment**

A non-contrast brain Computed Tomography (CT) scan was performed to rule out subarachnoid hemorrhage. The CT showed no radiological significant findings. Magnetic Resonance imaging was not available in our primary health care facility and the clinical status of the patient was unstable so that she couldn’t be transferred to a tertiary health care center where an MRI is available. Full laboratory tests were within normal ranges except for a clinically significant hypoglycemia and mild hyponatremia. Glucose level was checked multiple times to avoid measurement errors. However, she was hypoglycemic (Glucose = 52 mg/dl; level II hypoglycemia according to 2017 American Diabetes Association classification of hypoglycemia).

Laboratory findings: (White Blood Cells = 6200 /mm\(^3\), Neutrophils/Lymphocytes: 55/45, Platelets = 330 × 10\(^3\) /mm\(^3\), Hemoglobin = 11.3 g/dl, sodium = 130 mEq/L, potassium = 4 mEq/L, Creatinine = 0.6 mg/dL, Glucose = 52 mg/dL)

**Therapeutic intervention**

Intravenous dextrose was administered and strabismus gradually resolved, and headache subsided within an hour.

**Follow up and outcomes**

A metabolic profile was ordered which was within normal ranges except mild decrease in sodium and hypoglycemia. A follow-up appointment with an endocrinologist was scheduled to evaluate the patient’s condition and ensure there are no other underlying health issues. A dietary plan was established to maintain the patient’s blood glucose levels within the normal range and reduce the risk of future hypoglycemic episodes.

**DISCUSSION**

Hypoglycemia can affect the oculomotor system in several ways. One of the most significant effects is impairing the fixation on a target ability. Studies have shown that during episodes of hypoglycemia, individuals are more likely to experience micro-saccades, which are small involuntary movements of the eyes that can disrupt fixation and lead to blurred vision\(^4\). Additionally, hypoglycemia can impair the ability to perform smooth pursuits, which are slow, tracking movements of the eyes that are necessary for following moving objects\(^4\).

In this case hypoglycemia occurred because of prolonged fasting (more than 15 hours deprived of water and food) which might depleted the glygon storage and caused this clinically significant hypoglycemia.

The mechanisms underlying these effects are not fully understood, but it is thought that hypoglycemia may interfere with the metabolism of glucose in the oculomotor system, leading to a decrease in Adenosine Triphosphate (ATP) production and subsequent impairment of neural activity\(^5\). Additionally, hypoglycemia may affect neurotransmitter levels in the brain, including dopamine and acetylcholine, which are important for proper oculomotor function\(^6\).

On April 6, 2023 we searched PubMed for similar cases using the terms Hypoglycemia and abducens palsy. A case reported by Anhaus et al. where a 56-year-old woman experienced increasingly severe hypoglycemic attacks with glucose levels dropping as low as 20 mg/dl and had insulinoma. She developed a right abducens nerve paresis lasted for six weeks\(^7\).

Another case study in which an 85-year-old woman presented to the hospital with coma and roving eye movements. Laboratory investigations revealed low serum glucose levels. Brain MRI imaging showed extensive bilateral frontoparietal lesions on FLAIR and DWI. Although her blood glucose was corrected, she did not regain consciousness and her roving eye movements stopped the next day\(^8\).

In conclusion, hypoglycemia can have significant effects on the oculomotor system, leading to impairment of fixation and smooth pursuit. Further research is needed to fully understand the underlying mechanisms and develop effective treatments for this condition.

**NOTES**

**Ethics statement**

The informed consent was taken from the patient.
Author contributions
Conceptualization: MHA. Data curation: MHA (M-Hozaifa Alothman), MHA (Muhammad Hussam Alothman). Formal analysis: MHA. Investigation: MHA. Methodology: MHA (M-Hozaifa Alothman), MHA (Muhammad Hussam Alothman). Resources: MHA. Software: MHA (M-Hozaifa Alothman), MHA (Muhammad Hussam Alothman). Supervision: MHA. Validation: MHA (M-Hozaifa Alothman), MHA (Muhammad Hussam Alothman). Visualization: All authors. Writing – original draft: All authors. Writing – review & editing: All authors.

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REFERENCES