The Efficacy and Safety of Glucagon-Like Peptide 1 Receptor Agonist in Children with Chemotherapy Induced Hyperglycemia

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INTRODUCTION

- Hyperglycemia is a common side effect of acute lymphoblastic leukemia (ALL) therapy.
- It has long been recognized as a consequence of corticosteroids and asparaginase, chemotherapeutic agents key to ALL treatment.
- Glucagon-like peptide-1 (GLP-1) receptor agonists are a recently discovered type 2 diabetes treatment.
- Treatment with GLP-1 receptor agonists was found to prevent glucocorticoid-induced glucose intolerance and islet-cell dysfunction in humans.
- Recent guidelines by the American Diabetes Association and the European Association for the Study of Diabetes recommend that for patients with type 2 diabetes GLP-1 receptor agonists are preferable to insulin as the initial injection therapy and are also the preferred choice for addition to basal insulin for combination injection therapy.

AIM OF THE WORK

- To assess the efficacy and safety of GLP-1 receptor agonist in the management of chemotherapy induced hyperglycemia in children with acute lymphoblastic leukemia.

SUBJECTS AND METHODS

This prospective case control study Is being conducted on 30 children having chemotherapy induced hyperglycemia recruited from the regular attendees of the Pediatric Hematology Oncology Unit, Pediatric Hospital, Ain Shams University.

Inclusion criteria:

- Age > 10 years old.
- Children with ALL diagnosed by bone marrow on corticosteroids and asparaginase used in the induction chemotherapy.

Exclusion criteria:

- Children with other types of cancer.
- Patients with associated type 1 or type 2 diabetes.
- Children with obesity.

Sample size:

- Sample size was calculated assuming a response to GLP1 agonist of 50% compared to 95% among the group receiving insulin, a sample of 15 patients in each group will be enough to detect such difference according to previous study conducted by (Ebbesen et al., 2019).

Ethical and Safety Consideration:

This study is being done after approval of the Ethical Committee of the Faculty of Medicine, Ain Shams University. Written informed consent is taken from children caregivers before recruitment in the study, and after explaining the purpose and procedures of the study.

Randomization and study groups

Each of the eligible children will be randomly assigned by simple randomization to either group I and group II.

Group I (GLP-1RA group): consists of 15 pediatric patients having chemotherapy induced hyperglycemia will receive GLP-1RA in a dose of 0.75 mg once weekly.

Group II: consists of 15 pediatric patients having chemotherapy induced hyperglycemia who will receive insulin therapy basal regimen.

Baseline clinical assessment:

- **Clinical history:** Demographic data, age of onset of ALL, disease duration, duration and dose of chemotherapy.
- **Clinical examination:** anthropometric measure, blood pressure (mmHg).
- **Laboratory analysis:**
  - Routine liver and kidney function tests.
  - Fasting blood glucose.
  - Random blood glucose.
  - HbA1c%.
  - Fasting C peptide.
  - Lipid profile.

Follow-up and outcome variables

Glycemic profile (fasting blood glucose and HbA1c), will be done at the start of the study (day 0) and at the study endpoint (12 weeks).
Any side effects related to GLP-1 will be reported including:

- Gastrointestinal disorders: nausea, diarrhea, vomiting, constipation, abdominal pain, and dyspepsia.
- Cardiovascular system: increase in heart rate.
- Allergy.
- Skin side effects: Injection site reactions, such as rash, erythema, or itching at the injection site
- Endocrine effects: increase in the rate or severity of clinically relevant hypoglycemic events.

Study Outcomes

- Primary outcome: Efficacy of Glp-1 receptor agonist in management of chemotherapy induced hyperglycemia in children with ALL by measuring HbA1c and mean fasting and random blood glucose readings.
- Secondary outcomes: Safety of GLP-1RA in children and reporting its side effects.