

## Reactive Hypoglycaemia of Pre-Diabetes: A Diagnostic Delima

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Received on 12.01.2019,  
Accepted on 06.03.2019

### Abstract

Reactive hypoglycemia, postprandial hypoglycemia, or sugar crash is characterized by recurrent episodes of symptomatic hypoglycemia occurring within 4 hour after a high carbohydrate meal. The frequent sampling of postprandial blood glucose levels will frequently lead to the value below 50 mg/dl, with no hypothalamic-pituitary-adrenal (HPA) stress to the low blood sugar and do not manifest adrenergic symptoms. HbA1C levels between 5.7%-6.4% are suggestive of pre-diabetes. According to the Centers for Disease Control and Prevention (CDC), about 15-30% people with pre-diabetes symptoms progress to type 2 diabetes mellitus within 5 years if they fail to make appropriate lifestyle changes.

**Keywords:** Reactive Hypoglycaemia; Diabetes mellitus; hypothalamic-pituitary-adrenal (HPA).

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### Introduction

Reactive hypoglycemia, postprandial hypoglycemia, or sugar crash is characterized by recurrent episodes of symptomatic hypoglycemia occurring within 4 hour after a high carbohydrate meal. The alleged mechanism for the feeling of a crash is correlated with an abnormally rapid rise in blood glucose after eating. This normally leads to insulin secretion (known as an insulin spike), which in turn initiates rapid glucose uptake by tissues either accumulating it as glycogen or utilizing it for energy production. The consequent fall in blood glucose is indicated as the reason for the "sugar crash". In pre-diabetes, the cells are resistant to the effect of insulin and the pancreas can't produce enough to overcome this resistance. As a result, glucose levels build up in the blood.

It is manifested as double vision or blurry vision, unclear thinking, insomnia, palpitations, fatigue, dizziness, light-headedness, sweating, headaches, nervousness, muscle twitches, irritability, tremors, disorientation, flushing, the need to sleep or 'crash', coma can be a result in severe untreated episodes.

According to the U.S. National Institute of Health (NIH), a blood glucose level below 70 mg/dL at the time of symptoms followed by relief after eating confirms a diagnosis for reactive hypoglycemia.

The majority of people with pre-diabetes have no symptoms and it remains undiagnosed until routine blood investigations reveal an elevated blood glucose levels. Some, however, will experience symptoms characteristic of diabetes such as increased thirst, frequent urination, fatigue, or blurred vision.

Pre-diabetes and type 2 diabetes mellitus are diagnosed based on the following test results:

#### *Pre-diabetes-*

- Fasting glucose test: 100-125 milligrams per deciliter (mg/dl)
- Oral glucose tolerance test: 140-199 mg/dl
- HbA1c: 5.7-6.4%

#### *Type 2 diabetes mellitus-*

- Fasting glucose test: 126 mg/dl or higher

- Oral glucose tolerance test: 200 mg/dl or higher
- HbA1c: ≥ 6.5%

The treatment of reactive hypoglycemia of pre-diabetes focuses on preventing further attacks & relieving acute symptoms.

- Low carbohydrate diet and/or frequent small split meals is the first & most important treatment of this condition.
- Avoiding or limiting sugar intake, exercising regularly, eating a variety of foods including meat, poultry, fish or nonmeat sources of protein, foods such as whole-grains, fruits, nuts, vegetables, and dairy products, choosing high-fiber foods.
- Avoiding eating meals or snacks composed entirely of carbohydrates; simultaneously ingest fats and proteins, which have slower rates of absorption.
- Consistently choosing longer lasting, complex carbohydrates to prevent rapid blood-sugar dips in the event that one does consume a disproportionately large amount of carbohydrates with a meal.

### Case Report

38 yr old female patient, with no pre-existing co-morbidities, had visited to OPD with C/o sudden onset palpitations & sinking sensation since 1-2 days, not associated with h/o vomiting/ blurring of vision/ headache/ chest pain/ syncope/ shortness of breath/ sweating. Patient had h/o similar complaints 10 days back. RBS-63 MG/DL. She immediately consumed a packet of 5g of sugar but her symptoms didn't relieve. A couple of minutes later, she fainted. Code RRT was announced and patient was therefore brought to the emergency department. There was no family h/o diabetes mellitus.

#### On Examination-

Airway Assessment: Patent, Protected, Talking

#### Breathing Assessment:

Respiratory Rate-12/min

Laboured-No

SpO<sub>2</sub>-98% on room air

#### Circulation

Pulse-90/min

BP-130/70 mmhg  
Peripheral Pulse-Palpable  
Temperature-98.4 degree F

#### Disability

GRBS-56 mg/dl  
GCS-E4V5M6  
Pupils-B/L Reactive

#### Exposure:

Afebrile  
No exanthematous/petechial rashes noted, no injuries/ scars/ venous engorgements noted.

#### AMPLE History:

Allergies-None  
Medications-None  
Past Medical History- nothing significant  
Last Meal- 1 hour back  
LMP-17/6/18 (10 days back from the date of case reporting)  
ECG- Sinus Tachycardia

#### Care Plan:

- ✓ IV Fluids 100 ml 25% Dextrose NS STAT
- ✓ IV Fluids 0.9% NS @100 ml/Hr
- ✓ 2 hourly RBS monitoring
- ✓ Immediate Physician reference was taken in view of recurrent hypoglycemia
- ✓ Room admission was planned
- ✓ Routine Investigations were sent- CBC, LFT, KFT, Serum Electrolytes, HbA1c, C-peptide levels.
- ✓ USG Whole Abdomen was immediately ordered for diagnosis of insulinoma.
- ✓ Patient was shifted to the room & reports were chased.

#### Differential Diagnosis of Hypoglycemia:

- ✓ Insulinoma
- ✓ Addison's Disease
- ✓ Hypopituitarism
- ✓ Anxiety disorders

*Investigations*

- ✓ CBC: Haemoglobin-12.7, Platelet Count-2,67,000, TLC-10,600
- ✓ LFT: Total bilirubin-0.21, Direct-0.03, SGOT/SGPT-WNL
- ✓ KFT: S.Creatinine-0.46, Urea-13, S.Sodium-140
- ✓ Thyroid Profile: FT3-2.66, FT4-0.92, TSH-2.04
- ✓ HbA1c: 5.7
- ✓ C-peptide: 19.4 (1.1-4.4)
- ✓ Pro-insulin: 28.90 pmol/L (<18.8)
- ✓ Fasting Insulin: 36.75 uIU/ml (1.9-23.0)
- ✓ Prolactin: 14.52 ng/mL (3.34-26.74)
- ✓ S. Cotisol: 12.26 ug/dl (6.7-22.6)
- ✓ IGF-1 (Somatomedin-C): 212 (109-284)

*Course In The Hospital:*

2 hrs after being shifted to the ICU, patient's RBS raised to 213 mg/dL but on subsequent RBS monitoring, readings dropped down to 42 mg/dl which raised to 58 mg/Dl after 100 ml 25% Dextrose infusion. 10% DNS was started at 100 ml/hr. CECT abdomen & MRI Brain with Contrast was done which showed no significant abnormality. Gastroenterology & Endocrinology reference were obtained for the same.

*Discharge Advice*

Low carbohydrate diet with small frequent meals

*Diagnosis*

Reactive Hypoglycemia of Pre-diabetes

**Conclusion**

This above case report shows how confusing the clinical presentation can be. The recurrent hypoglycemia was initially thought to be due to Insulinoma and in view of that USG whole abdomen was also done. But inconclusive labs & radiological investigations changed the entire diagnosis.

Although the patient improved but such patients can return back with similar events in future. Therefore, it is necessary to thoroughly counsel the patient regarding the condition & necessary actions must be taken. The best treatment would be intake of small frequent low carbohydrate meals with regular RBS monitoring. From the emergency medicine perspective, in such cases we should keep our mind open to variety of differential diagnosis.

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