

HYPOGLYCEMIA-FROM PRESENTATION TO MANAGEMENT

Introduction

Diabetic hypoglycemia is a low blood glucose level occurring in a person with diabetes mellitus. The commonly used value to define the lower limit of normal glucose is 70 mg/dl though in someone with diabetes, hypoglycemic symptoms can sometimes occur at higher glucose levels, or may fail to occur at lower levels. Diabetic hypoglycemia can be mild, recognized easily by the patient, and reversed with a small amount of carbohydrates eaten or drunk, or it may be severe enough to cause unconsciousness requiring intravenous dextrose or an injection of glucagon. Severe hypoglycemic unconsciousness is one form of diabetic coma. A common medical definition of severe hypoglycemia is "hypoglycemia severe enough that the person needs assistance in dealing with it."

Causes of hypoglycemia in diabetics

1. Diabetes Medications

- a) Side effect of some diabetes medications, including insulin and OHAs
 - chlorpropamide
 - glimepiride
 - glipizide
 - glibenclamide
 - repaglinide
 - sitagliptin
 - b) Certain combination pills can also cause hypoglycemia, including
 - glipizide + metformin
 - glibenclamide + metformin
 - pioglitazone + glimepiride
 - rosiglitazone + glimepiride
 - sitagliptin + metformin
 - c) Following injectable medications can cause hypoglycemia:
 - Pramlintide which is used along with insulin
 - Exenatide which can cause hypoglycemia when used in combination with chlorpropamide, glimepiride, glipizide, glibenclamide
2. Meals or snacks that are too small, delayed, or skipped
 3. Increased physical activity
 4. Alcohol

Symptoms of hypoglycemia

Symptoms of diabetic hypoglycemia, may be neuroglycopenic, adrenergic, and abdominal. Symptoms and effects can be mild, moderate or severe, depending on how low the glucose falls and a variety of other factors. It is rare but possible for diabetic hypoglycemia to result in brain damage or death.

Symptoms include

- hunger
- tremors
- nervousness

- sweating
- dizziness or light-headedness
- sleepiness
- confusion
- difficulty in speaking
- anxiety
- weakness

Without treatment, more severe hypoglycemia symptoms may develop, including:

- Headache
- Poor coordination
- Poor concentration
- Numbness in mouth and tongue
- Coma

Hypoglycemia can also happen during sleep. Some signs of hypoglycemia during sleep include

- crying out or having nightmares
- feeling tired, irritable, or confused after waking up

Prevention of hypoglycemia

Diabetes treatment plans are designed to match the dose and timing of medication to a person's usual schedule of meals and activities. Mismatches could result in hypoglycemia..

To help prevent hypoglycemia, people with diabetes should always consider the following:

- **Diabetes medications** should be taken in the recommended doses at the recommended times.
- **Meal plan** - People with diabetes should eat regular meals, have enough food at each meal, and try not to skip meals or snacks. Snacks are particularly important for some people before going to sleep or exercising.
- **Daily activity.** To help prevent hypoglycemia caused by physical activity,
 - checking blood glucose before sports, exercise, or other physical activity and having a snack if the level is below 100 milligrams per deciliter (mg/dL)
 - adjusting medication before physical activity
 - checking blood glucose at regular intervals during extended periods of physical activity and having snacks as needed
 - checking blood glucose periodically after physical activity
 is important
- **Avoid alcohol.** Alcohol can cause hypoglycemia
- **Diabetes management plan.** Intensive diabetes management can increase the risk of hypoglycemia.

Treatment of hypoglycemia

- Glucose (15–20 g) is the preferred treatment for the conscious individual with hypoglycemia, although any form of carbohydrate that contains glucose may be used. If SMBG 15 min after treatment shows continued hypoglycemia, the treatment should be repeated. Once SMBG glucose returns to normal, the individual should consume a meal or snack to prevent recurrence of hypoglycemia
- If a person cannot receive oral glucose such as the case with unconsciousness, seizures, or altered mental status, then a peripheral or central IV line should be established and

dextrose administered. Dextrose 25% is given in children under the age of 8, and Dextrose 50% is given in adults. The Dosage for D50W is one half of the ampoule, with verification of IV patency after the half of the amp is given, and a recheck of blood glucose levels before administering the other half. Dextrose 25% and 50% are heavily necrotic due to their hyperosmolarity, and should only be given through a patent IV line - Any infiltration can cause massive tissue necrosis. This may be followed by a solution containing dextrose and saline (5%, 10%,)

- Glucagon should be prescribed for all individuals at significant risk of severe hypoglycemia, and caregivers or family members of these individuals should be instructed in its administration. Glucagon administration is not limited to health care professionals. The glucagon in the vial is a lyophilized pellet, which must be reconstituted with 1 ml of sterile water. Glucagon vials contain 1 mg, which is a standard adult dose. Glucagon works if given subcutaneously, but absorption and recovery are faster if it is injected deep into a muscle. Effects of glucagon can include nausea and headache, but these can also occur after severe hypoglycemia even when glucagon is not used. Risks of glucagon use are far lower than risks of severe hypoglycemia, and it can usually produce a faster recovery than calling for medical aid and waiting for them to start an intravenous line to give dextrose
- Individuals with hypoglycemia unawareness or one or more episodes of severe hypoglycemia should be advised to raise their glycemic targets to strictly avoid further hypoglycemia for at least several weeks to partially reverse hypoglycemia unawareness and reduce risk of future episodes

Take home messages

- Hypoglycemia in diabetes is defined as “all episodes of abnormally low plasma glucose concentration that expose the individual to potential harm
- The commonly used value to define the lower limit of normal glucose is 70 mg/dl
- Symptoms of diabetic hypoglycemia may be neuroglycopenic, adrenergic, and abdominal. Symptoms and effects can be mild, moderate or severe, depending on how low the glucose falls and a variety of other factors
- When hypoglycemia occurs in the absence of such symptoms it is called hypoglycemic unawareness.
- Glucose (15–20 g) is the preferred treatment for the conscious individual with hypoglycemia, although any form of carbohydrate that contains glucose may be used
- In patients with unconsciousness, seizures, or altered mental status a peripheral or central IV line should be established and dextrose administered. Dextrose 25% is given in children under the age of 8, and Dextrose 50% is given in adults
- Glucagon should be prescribed for all individuals at significant risk of severe hypoglycemia

Brain Teaser

True/False

1. Severe hypoglycaemia is an event requiring assistance of another person to actively administer carbohydrate, glucagon or other resuscitation actions

2. Asymptomatic hypoglycaemia is a n event not accompanied by typical symptoms of hypoglycemia but with a measured plasma glucose concentration ≤ 100 mg/dl
3. Symtoms of neuroglycopenia are anxiety, palpitation and sweating
4. To help prevent hypoglycemia caused by physical activity, checking blood glucose before sports, exercise, or other physical activity and having a snack if the level is below 100 milligrams per decilitre is important
5. Intensive diabetes management can increase the risk of hypoglycemia
6. Glucose (15–20 g) is the preferred treatment for the conscious individual with hypoglycemia

Ans. 1 True, 3 False, 3 False, 4 True, 5 True, 6 True

Individuals with hypoglycemia unawareness or one or more episodes of severe hypoglycemia should be advised to raise their glycemic targets to strictly avoid further hypoglycemia

Reference

Defining and reporting hypoglycemia in diabetes, A report from the American Diabetes Association workgroup on hypoglycemia, Diabetes Care May 2005 vol. 28 no. 5 1245-1249