ABSTRACT

Background: Patients with Type 2 Diabetes Mellitus (T2DM) are hyperinsulinenic but are treated with insulin to “overcome insulin resistance.”

Objective and Method: Present data from bariatric surgery and review the literature on health outcomes of using insulin to treat T2DM.

Results: After bariatric surgery, insulin and glucose levels return to normal but insulin resistance remains high.

Conclusion: The use of insulin, a hormone that acts as a mitogen and causes lipid storage, in the treatment of T2DM needs serious evaluation.

INTRODUCTION

Diabetes

- In 2019, diabetes claimed the lives of 83,464 people, making it the 7th leading cause of death in the US.
- Diabetes is a metabolic disorder that alters the body’s ability to process glucose.
- As far as type 2 diabetes, there are multiple causative factors including lifestyle and genetics, but it is widely accepted that insulin resistance causes both the hyperglycemia and the compensatory hyperinsulinemia that it characteristic of the disease.

Insulin

- Insulin is a hormone produced by the pancreas that enables glucose uptake into the cells.
- Insulin is a strong antiproliferative hormone that drives the body into a state of energy storage

Insulin Resistance

- The term insulin resistance was defined in 1941 when scientists observed patients who required more than 200 units of insulin per day in order to gain glycemic control.

METHODS

- Review data obtained during studies done at ECU on patients before and after bariatric surgery
- Conduct a literature review via PubMed to analyze (1) data on T2DM remission from bariatric surgery and (2) assess the health outcomes associated with the use of insulin in the treatment of T2DM.

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BARIATRIC SURGERY DATA

Fasting insulin levels in Obesity and T2D

T2D patients secrete high amounts of insulin even when fasting and asleep

DATA SURROUNDING THE USE OF INSULIN IN PATIENTS WITH T2DM

Mortality

Studies show that insulin is associated with an increase in 90-day mortality, cancer mortality and all-cause mortality.

Weight Gain

A 6-month trial showed that intensive insulin therapy for T2DM was associated with a 9.3% weight gain of initial body weight despite reduced caloric intake.

Beta-Cell Apoptosis

Transplantation of an insulinoma into metabolically normal mice showed an increase in beta-cell apoptosis and a decrease in beta-cell mass.

Severe Hypoglycemia

In comparison with DPP4i and T2D as an add on to treatment with metformin, insulin was associated with an increase in the number of cases of severe hypoglycemic episodes.

DISCUSSION

- Fasting insulin levels in patients with T2DM can be as high as 9x higher than metabolically normal patients.
- Even after insulin secretion falls in patients with progressed T2DM, their basal secretion is still higher than the secretion levels in metabolically normal patients.
- After bariatric surgery, blood-glucose levels normalize, and the administration of insulin is no longer needed.
- Though insulin and glucose levels normalize, insulin resistance remains high. This suggests that insulin resistance may not be the root cause of T2DM.
- If insulin resistance is not the main cause of T2DM, the use of insulin needs review.
- The literature may suggest that the use of insulin in T2DM patients may have potentially harmful side effects and needs to be reviewed.

CONCLUSIONS

- Bariatric surgery induced weight loss and glycemic control in obese patients.
- If insulin resistance is the cause of hyperglycemia and hyperinsulinemia, it should be corrected before glucose and insulin levels return to normal.
- Data from bariatric surgery does not support the idea that insulin resistance causes T2DM.
- Since the purpose of treating T2DM patients with insulin is to overcome insulin resistance”, this practice needs to be carefully reviewed.

Future Studies

- Analyze the efficacy of using insulin as an add on therapy in comparison with oral glucose medications.
- Repeat studies conducted before 2010 to verify results.
- Evaluate the true cause of T2DM as indicated by data from bariatric surgery.