

Nutritional Management of Type 3c Diabetes

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Overview

- What is Type 3c Diabetes
- Characteristics and differences from other types of diabetes
- Prevalence
- Diagnosis
- Treatment and management
- Nutritional considerations
- Case study



Definition & Characteristics

- Type 3c diabetes is **diabetes secondary to pancreatic disease / damage to the pancreas**
- Also known as **pancreatogenic diabetes**
- Characterised by **progressive insulin deficiency.**
- Associated conditions – acute/chronic pancreatitis, pancreatic cancer, pancreatic surgery, cystic fibrosis, haemochromatosis.

Characteristics

Parameter	Type 1 IDDM	Type 2 NIDDM	Type 3c Pancreatogenic
Ketoacidosis	Common	Rare	<u>Rare</u>
Hyperglycemia	Severe	Usually mild	<u>Mild</u>
Hypoglycemia	Common	Rare	<u>Common</u>
Peripheral insulin sensitivity	Normal or increased	Decreased	<u>Increased</u>
Hepatic insulin sensitivity	Normal	Normal or decreased	<u>Decreased</u>
Insulin levels	Low	High	Low
Glucagon levels	Normal or high	Normal or high	Low
PP levels	Normal or low (late)	High	Low
GIP levels	Normal or low	Normal	Low
GLP1 levels	Normal	Normal or low	Normal or high
Typical age of onset	Childhood or adolescence	Adulthood	Any

IDDM, insulin-dependent diabetes mellitus; NIDDM, non-insulin-dependent diabetes mellitus; PP, pancreatic polypeptide; GIP, glucose-dependent insulinotropic polypeptide; GLP1, glucagon-like peptide 1. Modified, with permission, from Slezak LA & Andersen DK 2001 Pancreatic resection: effects on glucose metabolism. *World Journal of Surgery* **25** 452–460. Copyright 2001 International Society of Surgery.

Prevalence of Type 3c diabetes

- **5%-10%** of all diabetes mellitus cases in Western populations
- Chronic pancreatitis accounts for up to **80%** of all type 3c diabetes mellitus cases
- Could be higher as often cases are misclassified

(Ewald & Hardt, 2013)

Diagnosis

Table 2 Proposed diagnostic criteria for type 3c diabetes mellitus

Major criteria (must be present)

Presence of exocrine pancreatic insufficiency (monoclonal fecal elastase-1 test or direct function tests)

Pathological pancreatic imaging (endoscopic ultrasound, MRI, CT)

Absence of type 1 diabetes mellitus associated autoimmune markers

Minor criteria

Absent pancreatic polypeptide secretion

Impaired incretin secretion (*e.g.*, GLP-1)

No excessive insulin resistance (*e.g.*, HOMA-IR)

Impaired beta cell function (*e.g.*, HOMA-B, C-Peptide/glucose-ratio)

Low serum levels of lipid soluble vitamins (A, D, E and K)

MRI: Magnetic resonance imaging; CT: Computed tomography; GLP-1: Glucagon-like peptide-1; HOMA-IR: Homeostasis model assessment of insulin resistance; HOMA-B: Homeostasis model assessment of beta-cell.

Treatment and Management

NICE guideline [NG104] - Pancreatitis

- Offer people with chronic pancreatitis monitoring of HbA1c for diabetes at **least every 6 months** (lifetime risk as high as 80%)
- Assess people with type 3c diabetes **every 6 months** for potential benefit of insulin therapy.
- For people who are **not using insulin** – refer to NICE guidelines on type 2 diabetes
- For people **who need insulin** – refer to NICE guidelines on type 1 diabetes.

Nutritional Considerations

Table 2. Suggested Principles of Management/Management Strategies for Type 3c Diabetes in Chronic Pancreatitis

(Duggan & Conlon, 2017)

Principles of Management	Management Strategies
<p><i>Prevent:</i></p> <ul style="list-style-type: none">• Hypoglycemia• Hyperglycemia• Exacerbation of malnutrition• Malabsorption• Co-morbidities associated with diabetes (e.g. retinopathy, renal disease)	<ul style="list-style-type: none">• Regular meal pattern with regular starchy carbohydrates• Do not skip meals• Take small, frequent meals• Measure glucose levels frequently, particularly if on insulin, after physical activity, if diet is poor, and if any hypoglycemic symptoms• Avoid alcohol; smoking cessation• Ensure adequacy of (PERT)• Minimize high-sugar/ high-glycemic index food or fluids• Consider a diary to record diet, glucose levels, PERT, exercise, at least until acceptable glucose control is maintained• Routine dietitian assessment/ monitoring

Reprinted and adapted with permission from: Duggan & Conlon.¹⁹ A Practical Guide to the Nutritional Management of Chronic Pancreatitis. Nutrition Issues in Gastroenterology; Practical Gastroenterology. June 2013.

Issues

- Lack of Awareness
- “Brittle Diabetes”
- Pancreatic Exocrine Insufficiency - absence of PERT, inadequate dosing and/or incorrect use
- Malnutrition

Case Study

- 65 year old male
- Pancreatic exocrine insufficiency on background of Whipples procedure for pancreatic tumour
- Admitted with symptomatic hyperglycaemia – HbA1c 113mmols/mol. Commenced on basal bolus insulin therapy.

Case study

- BMI 17kg/m².
- History of 19kg (25%) weight loss over 2 years and further 2kg decrease more recently.
- Irregular meal pattern prior to diabetes diagnosis.
- Since diagnosis and initial education – regular meals and increased intake to aid weight gain.
- Large Creon doses (25000 units x 10+ capsules per meal).
- Due to complex GI history – unable to tolerate various higher fibre foods.
- Limited CHO awareness.

Case Study

- What additional information would you need to consider?
- What would be the nutritional aims of treatment?
- What plan would you put in place?

References

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