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Type 2 Diabetes (T2D)

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Introduction

- Type 2 diabetes (T2D) is long-term, chronic condition affecting the way the body processes glucose.
- More common than type 1 diabetes, T2D involves the body not producing enough insulin or resistance to insulin (Leonitis & Hess-Fischl, 2019).
- Previously considered adult onset, evidence reveals increased prevalence of T2D in children, contributing to the growing number of 29.1 million people in the US with this disease (Cornell, 2015).
- A progressive disease, T2D predisposes individuals to heart disease, stroke, retinopathy, neuropathy, dementia, renal disease, amputation and early death (Skyler et al., 2017).
- Risk of developing T2D increases after age 40 (McCance & Huether, 2019).
- People with T2D spend more on healthcare, have fewer productive years and miss more work days compared to people who don't have T2D.

- In the last 20 years, the number of adults diagnosed with diabetes has more than tripled as the US population has aged and become more overweight ("Type 2 Diabetes-Data & Statistics," 2019).
- Diabetes care has a major economic impact worldwide, as a future family nurse practitioner (FNP) patient education on T2D risk factors, disease process and medical management are vital to halt this growing epidemic.

Signs & Symptoms

- Polydipsia
- Polyuria
- Polyphagia
- Hyperglycemia
- Fatigue
- Blurred vision
- Recurrent infections
- Poor wound healing
- Weight loss
- Areas darkened skin,, usually in armpits and neck
- Possibly asymptomatic

Leonitis & Hess-Fischl, 2019

Case Presentation

- Working in a Case Management role, this graduate nurse experiences first hand recurrent hospitalizations requiring patient education, utilization of resources and support to manage diabetes. C.P. is a 52-year-old man who most recently presented with A-fib, , neuropathy, open sores on both feet, hypertension, obesity as well as being a smoker. Initial blood glucose was 243 and when asked about home medications for diabetes patient exclaimed, "I don't have diabetes, my blood sugar is just high". Treatment of dysrhythmia, regulation of blood glucose, levels, treatment of open wounds required medication therapies and education.
- Obesity contributes to insulin resistance whereby serum levels of leptin, adiponectin and inflammation affect insulin synthesis and resistance (McCance & Huether, 2019).
- People with diabetes who smoke have increased risk of serious complications, such as heart disease, kidney disease, and poor blood flow in legs and feet predisposing them to infections and neuropathy.
- Collaborative education with a Diabetic Educator involved obtaining glucometer with education on use, storage of supplies, medication compliance, diet & lifestyle modifications as well as the importance of smoking cessation.
- Established patient with Chronic Care Management team for ongoing education, support and symptom management for overall health.

Insulin Resistance

https://www.kramesondemand.com/HealthSheet.aspx?id=89525&ContentTypeId=3
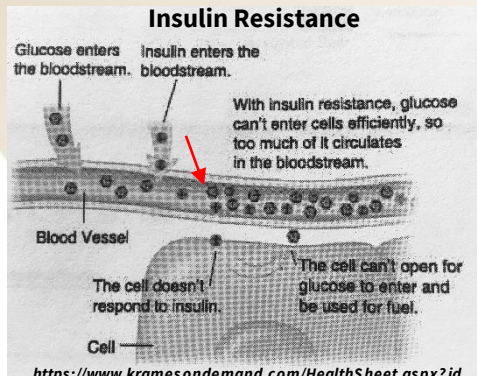
- Understanding T2D: food digested is used as fuel (glucose) for the body's cells.
- Glucose requires the hormone insulin to enter the cells.
- Produced by the pancreas, insulin is released into the bloodstream in response to the presence of glucose.
- In T2D, cells don't respond properly to insulin, therefore less glucose moves into cells (insulin resistance)
- Less glucose entering cells produces buildup of glucose in bloodstream (hyperglycemia).

Underlying Pathophysiology

FIGURE 22.14 Pathophysiology of Type 2 Diabetes Mellitus.

McCance & Huether, 2019, p. 690
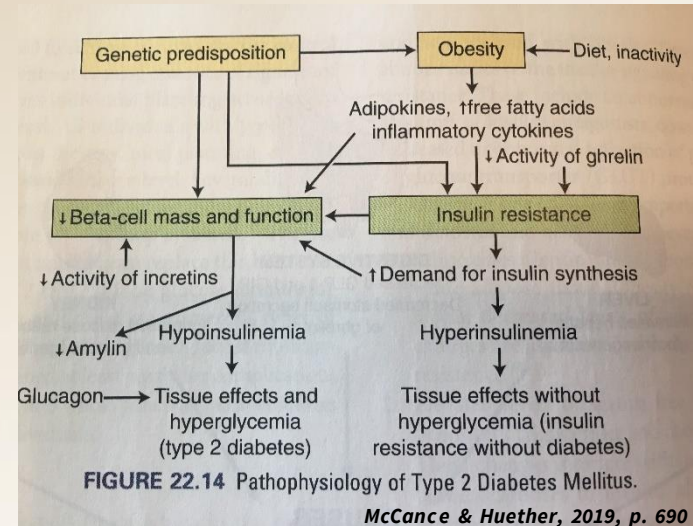
- Abnormalities of insulin signaling pathway with gradual progression.
- Pancreatic beta cell function= ability to sense blood glucose level, insulin synthesis and secrete insulin.
- Insulin necessary to unlock cells, thereby promoting glucose removal from the blood.
- Cells in muscle, liver and adipose tissue ineffective at absorbing insulin, likewise cannot regulate glucose levels (Brunton, 2016, p.3).
- Inability of cells to respond to insulin leads to insulin resistance.
- Hormones in GI tract such as amylin and ghrelin are diminished in T2D, thereby slowing gastric emptying, GI motility and promoting hunger.
- Impaired regulation of hepatic glucose, the liver overproduces glucose due to developed resistance to suppressive effect of insulin.
- Insulin resistance develops with ectopic fat deposition in the liver and muscle.
- Accumulation of fat in the pancreas contributes to decline in beta cell function, islet inflammation and eventual beta cell death (Skyler et al., 2017, p. 244).
- High levels of glucose in blood signal pancreas to secrete more insulin
- As disease progresses, pancreas is unable to keep up with the demand which leads to insulin insufficiency and finally hyperglycemia

Brunton, 2016

Risk Factors

- Obesity
- Family history- 40% greater if one parent has the disease
- Age, older than 45 years
- Physical inactivity
- Hypertension
- Diet/diet during pregnancy
- Male sex higher prevalence than female

- Metabolic syndrome
- Smoking increases incidence by 30-40%
- Sleep quality/quantity
- Depression
- Psychosocial factors
- Ethnicity (Black, Pacific Islander, Asian American, or Native American)
- Low socioeconomic status

Ley et al., 2016

Significance of Underlying Pathophysiology

- Chronic hyperglycemia leads to CAD, PAD, CVD (Brunton, 2016).
- Blood vessels damaged by consistent hyperglycemia lead to cataracts and retinopathy in the eyes, likewise diabetic neuropathy develops when blood vessels in nerves undergo damage.
- Peripheral neuropathy is loss of sensation in hands and more commonly feet from chronic nerve damage which leads to undetected sores predisposing individuals to infections.
- Gluconeogenesis occurs in the kidneys and liver, further exacerbating hyperglycemia.
- Diabetic nephropathy may develop as the kidneys are unable to filter impurities from blood (Skyler et al., 2017).
- Medications to treat T2D along with dietary management may lead to hypoglycemia as blood glucose levels regulate.

McCance & Huether, 2019

Implications for Nursing Care

- Patient and family education regarding disease process , signs and symptoms of hyper/hypoglycemia and prevention of T2D complications.
- Screening for at risk individuals to prevent or delay progression of T2D (Skyler et al., 2016).
- Nutritional management for balanced and healthy diet promotes glycemic control and healthy weight improving insulin sensitivity.
- Personalized approach for a regular exercise regimen thereby encouraging weight loss.
- Monitor one's feet, skin and eyes via annual check-up with their healthcare provider.
- Lab testing of blood and urine to check A1C, ketones in urine and cholesterol levels.
- Education on necessary diabetic supplies; glucometer, test strips, syringes/needles and proper storage/disposal for optimal use.
- Regular self -monitoring of blood glucose and tracking for target range.
- Instruction on medication administration, oral medication and insulin if needed.
- Coaching on support services and programs such as, Diabetes Self-management Education and Support Services (DSMES) provide a tailored approach to care utilizing evidence-based standards ("Managing Diabetes," 2018).
- Referral to resource The American Diabetes Association (ADA) at 800-342-2383 or www.diabetes.org.
- Education on smoking cessation in conjunction with nicotine replacement therapy to prevent further complications associated with T2D.
- Utilization/implementation of telehealth delivery of care supports patients in rural areas, where diabetes incidence is 17% more prevalent ("Type 2 Diabetes-Data & Statistics," 2019).

Conclusion

- T2D is a chronic condition and if not properly managed can result in serious health complications and death.
- Approximately 29.1 million people in the USA have diabetes; if current trend continues percentage is estimated to be 592 million people worldwide by 2035 (Cornell, 2015).
- Early diagnosis impacts the severity of disease. The treatment goal is restoration of normal blood glucose and correction of related metabolic disorders.
- In 2016, the CDC partnered with the ADA, the American Medical Association and the Ad Council promoting the first prediabetes awareness campaign. Sites such as, DoIHavePrediabetes.org allows people to inquire their risk of diabetes through quick test as well as providing links to nationwide sites for valuable information to improve health.
- Prevention is best, however once diagnosed with T2D managing disease involves lifestyle and dietary changes with support of healthcare professionals that promote health and improve quality of life.

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