

Infectious disease and diabetes

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Abstract

In this communication, we provide a bird's eye view of the various ways in which infectious diseases intersect with diabetes. We list the ways in which infectious diseases can influence glucose homeostasis and diabetes management, and explore how diabetes care is associated with infections and infection management. This is especially important for health care providers in regions with a high burden of infectious disease.

Keywords: Bacteria, communicable disease, fungus, protozoa, virus

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Introduction

Current diabetes guidelines recommend a person-centred approach for management of the syndrome. This approach is reflected in the recommendations suggested for specific populations, based upon their phase of life (childhood/adolescence, preconception/antenatal, and elderly) as well as comorbid status (micro or macrovascular complications). Infectious diseases form an important part of the spectrum of diabetes.¹⁻³ This is especially true for developing countries, where the burden of these diseases coexists with a relatively overburdened health care ecosystem.

Infectious diseases may be a cause, a confounding factor, a comorbid condition, a known complication, or even a contributory factor for control of diabetes. Box 1 lists some of the ways in which infectious diseases intersect with diabetes, while Box 2 suggests pragmatic tips for diabetes praxis.

This brief, yet comprehensive, article highlights the vast role of infection management in diabetes care, as well as diabetes treatment in the management of infectious disease.

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Box-1: Diabetes and Infectious Disease (ID)

Cause: ID may cause dysglycaemia, through

- Insulin resistance, e.g., HBV, HIV
- Insulin secretory defect, e.g., pancreatic infections
- Both, e.g., COVID 19

Coexistence: ID may report strong correlation with diabetes, e.g., tuberculosis, STDs

Comorbid conditions: ID may occur in poorly controlled diabetes, e.g., balanoposthitis, pruritis vulvae

Complications: Some ID are known to occur more frequently in diabetes, and may be listed as

complications, e.g., pyelonephritis, Fournier's gangrene, diabetic foot, mucormycosis, wet gangrene.

Confounding factor: ID management may lead to

- Hyperglycaemia, e.g., due to corticosteroids, inotropes, rifampicin
- Hypoglycaemia, e.g., due to quinine

Clinical conundrum: ID may be a differential diagnosis of dysglycaemia, e.g., litchi-induced hypoglycaemia and encephalitis; diabetic ketoacidosis and meningitis

Creation of iatrogenic ID: Sometimes, ID may occur as an iatrogenic complication of diabetes management, e.g., genital infections with SGLT_i, local infections at insulin injection/infusion site

Challenge in care: ID may create challenges in diabetes care by altering appetite, nutrient absorption, renal and hepatic function; skin infections/infestations may prevent optimal injection administration.

Contributing factor to masking: Some ID may be associated with hypoglycaemia, and may mask diabetes, e.g., malaria.

Clinical target modification: Presence of ID may require achievement of more stringent glycaemic targets to ensure resolution of infection

Concomitant medication concern: Drugs used in ID management may exhibit drug-drug interactions with glucose lowering drugs, e.g., gatifloxacin, itraconazole, dolutegravir.

Care in prevention: Vaccination against ID, such as influenza and pneumococcal pneumonia, is standard of care in diabetes praxis.

Key: HBV – hepatitis B virus, HIV – human immunodeficiency virus, ID – infectious disease, SGLT_{2i} – sodium glucose transporter 2 inhibitors, STDs – sexually transmitted diseases.

Box-2: Pragmatic Pointers for Praxis**In Diabetes Care**

- During clinical evaluation, ask and assess for symptoms and signs suggestive of ID.
- If required, order investigations to screen for, or confirm ID.
- In persons with uncontrolled diabetes, be vigilant for infections, both obvious and occult.
- In persons with erratic glycaemic control, enquire about infections as well as intake of anti-infective.
- Do note that signs of infection, such as fever and leukocytosis, may be suppressed in poorly controlled diabetes.
- Do note that asymptomatic pyuria, elevated CRP/ESR, mild leukocytosis may not necessarily indicate infection.
- Screen persons for genital and urinary tract infections prior to, and at regular intervals during, SGLTi use.
- Set appropriate glycaemic targets for persons with concomitant infections.
- Consider insulin therapy in persons with recurrent, resistant or refractory infection, as well as those with organ- or function-threatening infection.

In Infectious Disease Care

- Screen for dysglycaemia persons with "high risk" infections, viz,
 - STDs, including HIV
 - HBV
 - Tuberculosis
- Screen for dysglycaemia in persons with recurrent, resistant or refractory infections.
- Screen for dysglycaemia in persons with ID. Be mindful of the advantages of tight glucose levels, as well as the risk of hypoglycaemia.
- Avoid SGLTi in persons with active genito-urinary infections, and in those with a past history of upper urinary tract infection.
- Avoid GLP1RA, high dose metformin, and high dose alpha glucosidase inhibitors in persons with active gastrointestinal infection.
- Avoid sulfonylureas and fixed dose insulin regimens in persons with impaired or erratic appetite due to infection.
- Be mindful of complications and confounding conditions, such as hyperosmolar hyperglycaemia, diabetic ketoacidosis, euglycaemic ketoacidosis, hypoglycaemia, and hypoglycaemia unawareness.
- Be aware of the possibility of drug-drug interactions, and their resultant impact on glycaemic control, especially with anti-HIV, anti-fungal and anti-tubercular drugs.

For Prevention

- Screen all persons living with chronic infections for dysglycaemia at regular intervals.
- Screen all adults living with diabetes regularly for common infections, clinically or through investigations, if needed.
- Vaccinate all persons living with diabetes against common infections, as per standard of care
- Encourage basic hygiene in all persons, to prevent infections.
- Ensure healthy lifestyle in all persons to prevent/delay diabetes and its complications.

Key: CRP – C reactive protein, ESR – erythrocyte sedimentation rate, GLP1RA – glucagon like peptide 1 receptor agonists, HBV – hepatitis B virus, HIV – human immunodeficiency virus, ID – infectious disease, SGLT2i – sodium glucose transporter 2 inhibitors, STDs – sexually transmitted diseases.

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