

Chronic complications of diabetes: Contemporary classification

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Abstract

Traditionally, chronic complications of diabetes have been classified as microvascular and macrovascular. As our knowledge and understanding of diabetes develops, we increasingly find that conventional classifications and frameworks are unable to encapsulate the wide spectrum of the syndrome. We propose a seven-angled rubric, to serve as a contemporary taxonomic structure for diabetes complications. This includes not only the vascular consequences, but sapio-metabolic, oculo-metabolic, viscero-metabolic, musculoskeletal and repro-metabolic complications of diabetes as well. This taxonomic structure, presented in tabular and hexagonal form, should prove useful for all students of diabetology

Keywords: Chronic disease, complications, diabetes, type 2 diabetes, vascular complications, vessel disease

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Introduction

The conventional classification of chronic complications of diabetes, into macro-and macro-vascular conditions,¹ does not do justice to the wide spectrum of diseases that occur with diabetes.² It is also difficult, at times, to differentiate between complications on one hand, and comorbidities on the other. While a complication should be a direct result of diabetes, e.g. nephropathy, it may occur in persons without frank diabetes, e.g., in prediabetes, and may be due to a non-diabetic cause, e.g., chronic kidney disease or neuropathy.^{3,4} Similarly, while a comorbidity is expected to have a distinct etiology, many diseases, such as metabolic-associated fatty liver disease (MASLD), list diabetes and dysglycaemia as part of their etiologies.⁵

As the number of complications and comorbidities linked with diabetes increases, it makes sense to create a broader taxonomic framework for the same. This will make it easier for researchers, clinicians and students, to study the

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complexity of the syndrome in an effective manner.

Proposed Framework

No classification system can ever be 100% accurate. Systems which group us as living or non-living beings, plants or animals, vertebrates or invertebrates, mammals or non-mammals, and men or women, are not foolproof, either.

We propose a two layered classification rubric for the complications of diabetes. Seven domains, each listing three specific medical conditions, provide convenience and clarity to the reader. Table is self-explanatory. We feel this methodology is pragmatic as well as practical.

Domains and Description

The microvascular and macrovascular complications of diabetes are listed as two domains. Sapio-metabolic health, based on the Latin root sapiens, or intelligence, includes

Table: Classification of chronic complications of diabetes.

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- Microvascular
 - Nephropathy
 - Neuropathy
 - Retinopathy
 - Macrovascular
 - Cardiovascular disease
 - Peripheral arterial disease
 - Stroke
 - Sapio-metabolic
 - Distress/ depression
 - Dementia
 - Social stigma/isolation
 - Oculo-metabolic
 - Dry eye
 - Glaucoma
 - Premature cataract
 - Viscero-metabolic
 - Obstructive sleep apnea
 - Metabolic-associated fatty liver disease
 - Dermato-metabolic disease, e.g. acanthosis, skin tags, diabetic dermopathy
 - Musculoskeletal
 - Sarcopenia
 - Osteopenia
 - Osteoarthritis
 - Repro-metabolic
 - Late onset hypogonadism
 - Sexual dysfunction
 - Polycystic ovary syndrome
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psychological, psychiatric, cognitive and social complications of diabetes. We are tempted to include monetary or economic ill health as a complication of diabetes. However, this should be viewed as a failure of the health care system, rather than diabetes per se. Oculo-metabolic complications may be more accurately described as comorbid conditions. They deserve mention in this system so as to highlight the non-retinal aspect of eye care in diabetes. The phrase viscerometabolic includes dysfunction of virtually every organ-system in the body. While our list is currently limited to three diseases, there is no doubt that future experts will expand this further. The musculoskeletal system, being the heaviest organ system of the body, deserves a domain of its own. Rounding up the list is repro-metabolic complications, which includes the sexual as well as reproductive dysfunction so commonly encountered in diabetes.

Summary

The contemporary classification system listing 7 domains of chronic complications, is a useful tool to study diabetes and its comorbidities. This should serve students of the subject in good stead, and help improve comprehensive care of persons living with diabetes.

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