

## Etiologies underlying subtypes of long-standing type 2 diabetes

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**Statement of the Problem:** Type 2 diabetes (T2D) is a heterogeneous disease caused by genetic and environmental risk factors. Previous research attempted to deconstruct the heterogeneity of T2D by classifying T2D patients into subgroups, and they were focused on newly diagnosed European patients. This study, however, aimed to subtype T2D within a non-white Emirati ethnic population with long-standing diabetes, utilizing soft clustering based on etiological determinants of the disease.

**Methodology:** 348 Emirati patients with long-standing T2D were included in this study. The IBM SPSS Modeler's Auto Cluster model was used to cluster these patients into subgroups based on five clinical parameters (BMI, age at diagnosis, serum insulin levels, fasting blood glucose, and HbA1c). Further, Multinomial logistic regression was utilized to validate the clustering.

**Findings:** Soft clustering revealed five clusters: severe insulin-resistant diabetes (SIRD), severe insulin-deficient diabetes (SIDD), mild age-related diabetes (MARD), mild obesity-related diabetes (MOD), and mild early onset diabetes (MEOD). Among the 151 patients (43%), there was no overlap between clusters, whereas the remaining 197 patients (57%) displayed extensive overlap between clusters.

**Conclusion & Significance:** It is still feasible to detect T2D subtypes and underlying causes even in patients with long-standing T2D, and comorbidities. Due to large overlaps, clustering may not be useful for individual patient clinical management, yet clustering helps in understanding the architecture of T2D subtypes. Therefore, personalized metabolic profiling based on unique combinations of independent T2D determinants is probably a more practical strategy for patient management than subtyping.

# 17<sup>th</sup> European Diabetes and Endocrinology Congress

November 20-21, 2023

Dubai, UAE

## Recent Publications:

1. Alawadi, F., Bashier, A., Bin Hussain, A. A., Al-Hashmi, N., Bachet, F. A. T., Hassanein, M. M. A., Zidan, M. A., Soued, R., Khamis, A. H., Mukhopadhyay, D., Abdul, F., Osama, A., Sulaiman, F., Farooqi, M. H., & Bayoumi, R. A. L. (2023). Risk and predictors of severity and mortality in patients with type 2 diabetes and COVID-19 in Dubai. *World journal of diabetes*, 14(8), 1259–1270. <https://doi.org/10.4239/wjd.v14.i8.1259>
2. Baalfaqih, Z., Sulaiman, F., Abu-Samra, N., Alshaikh, M., Mawart, A., Osman, W., Mahmeed, W. A., Tay, G., & Alsafar, H. (2020). Association between genetic variants at chromosome 9p21 and risk of coronary artery disease in Emirati Type 2 Diabetes patients. *Gene Reports*. <https://doi.org/10.1016/j.genrep.2020.100892>

## Biography

Fatima Sulaiman is a PhD student at College of Medicine, Mohammed Bin Rashid University of Medicine and Health Sciences (MBRU), Dubai. She was educated in the UAE and UK. She obtained her master's degree in molecular medicine at University of Aberdeen, United Kingdom (2019-2020). She is currently a third year PhD student at MBRU. Fatima Sulaiman also has research experience in the field of human genomics and transcriptomics. She is currently involved in the study of deconstructing the heterogeneity of type 2 diabetes using clinical, genomic, and circulating extracellular RNA biomarkers Emirati patients. Throughout her career, she has held research positions at United Arab Emirates University and worked as molecular lab Specialist at Sanimed Laboratory – UAE. She has two research papers and her commitment to enhance the understating of the heterogeneity of type 2 diabetes will add significant contribution to the field.