

Time in range is associated with a decrease in prevalence and severity of diabetic peripheral neuropathy and cardiac autonomic neuropathy

Aim. A review to summarize recent evidence supporting an association between continuous glucose monitoring (CGM)-derived time in range (TIR) and microvascular complications among patients with type 2 diabetes mellitus (T2DM).

Methods. A systematic review which included 11 studies (13 987 patients) from full-text original articles that evaluated the association between CGM-derived TIR and risk of microvascular complications published between 2010 and June 2021.

Results. The median sample size was 466 patients (range: 105–5901), baseline HbA1c 8.2% (SD 0.5%), and duration of diabetes was 11.3 years (1.0). The majority of studies were conducted in Asia (10/11). Seven studies evaluated the relationship between CGM-derived TIR and diabetic peripheral neuropathy (DPN). The prevalence of DPN and cardiac autonomic neuropathy (CAN) was 46.6% and 32.1%, respectively. A 10% increase in TIR was associated with a reduction in albuminuria, severity of diabetic retinopathy, and prevalence of DPN and CAN. TIR >70% was associated with significantly lower prevalence of DPN compared with TIR <70%. Based on limited studies, TIR was found to more closely correlate with DPN and CAN compared with HbA1c.

Conclusions: TIR was associated with a decrease in prevalence and severity of both DPN and CAN. This study affirms the significant association between CGM-derived TIR and DPN among patients with T2DM.

Comments. CGM has already been shown to have benefit in patients through improving glycaemic control and quality of life. The use of CGM is becoming increasingly popular and CGM-derived metrics are now incorporated into the management of patients with diabetes. This systematic review provides a timely review of the current literature to extend our knowledge on the benefits of CGM beyond glycaemic control, as measured by HbA1c, in predicting the risk of microvascular complications.

The authors recognize the limitations of the study, which most notably is the heterogeneity in the outcomes of DPN used that prevented quantitative analysis. Unfortunately, this is a common problem faced with studies of DPN and perhaps why we are unable to make firm conclusions. To define DPN, different criteria such as sudomotor dysfunction, Michigan Neuropathy Screening Instrument, and Numerical Rating Scale were used in three different studies. For the evaluation of CAN, one study used five cardiac reflex tests, while only four cardiac reflex tests were used in another study. Furthermore, limited race/ethnicity, which was mainly Asian, restricted generalization of the findings.

This review highlights and affirms the relationship between CGM-derived TIR with DPN and CAN, which is important for future clinical practice as the use of CGM and technology in diabetes is increasing. However, further large-scale multicentre studies with standardized outcomes of DPN and CAN are warranted.

Shazli Azmi

Reference: Raj R, Mishra R, Jha N, Joshi V, Correa R, Kern PA. Time in range, as measured by continuous glucose monitor, as a predictor of microvascular complications in type 2 diabetes: a systematic review. *BMJ Open Diabetes Res Care*. 2022 Jan;10(1):e002573. doi: 10.1136/bmjdr-2021-002573.

<https://drc.bmj.com/content/bmjdr/10/1/e002573.full.pdf?with-ds=yes>