

Efficacy of Insulin Pump Therapy in Type 1 Diabetes Mellitus with a Focus on HbA1c Levels in Relation to Patient Age

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Abstract

We attempted to analyze the metabolic control (HbA1c) results of type 1 diabetes patients treated with insulin pump with a focus on patient age. Our findings show that the worst metabolic control results were observed in patients up to approximately 25 years of age. The best results were achieved by patients in their 30s. Patients older than 50 years, and even those older than 60 years, achieved better metabolic control than was observed in the younger group. The results of the study conclude that increased age should not be regarded as an indicator of an inability to effectively utilize insulin pumps as treatment options.

Keywords: Type 1 diabetes mellitus; insulin pumps; therapy; HbA1c, age.

Despite the already comparatively long history of insulin pump treatment, certain concerns related to its use in the elderly patients persist. Not many studies have been published this decade which address this important question. Yeoh et al.¹ compared the therapeutic outcomes of type 1 diabetes mellitus (T1DM) and type 2 diabetes mellitus (T2DM) patients who started pump treatment prior to 60 years of age, and those who started at a later age. The resultant analysis showed, inter alia, equal improvement in metabolic control (HbA1c) in both age groups. Matejko et al.² showed no statistically significant difference in HbA1c levels between the T1DM pump user groups 50+ and younger user groups.

We attempted to analyze the metabolic control results of patients from 4 separate diabetes centers, with a focus on patient age and from a slightly altered

perspective. We followed a protocol similar to the one published by Matejko et al.² and utilized the last available HbA1c value from each patient for the purposes of analysis. In total, the study comprised of 196 patients with Type 1 diabetes mellitus, with an average age of 39.6 ± 12.3 years; mean diabetes duration of 21.8 ± 11.1 years; and mean pump therapy duration of 7.0 ± 4.8 years. The study population consisted of 104 women (53.06%) and 92 men (46.94%), and compared the results of 160 patients aged 19-50 to 36 patients aged >50 years.

The mean HbA1c level for the entire study group was $8.6 \pm 1.9\%$ (70 ± 16 mmol / mol), and HbA1c levels did not differ between the two age groups. In the group aged 19-50 years, the mean HbA1c level was $8.6 \pm 1.9\%$ (70 ± 16 mmol / mol); and in the group aged >50 years, it was $8.6 \pm 1.8\%$ (71 ± 15 mmol / mol).

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In contrast to the aforementioned studies, we further attempted to analyze the attained HbA1c levels according to age, and across the entire group. Through use of a semiparametric generalized additive model (GAM)³, we estimated the shape of HbA1c dependence upon age in detail. The results of our analysis are presented in Figure 1.

The graph clearly shows that the worst metabolic control results were observed in patients younger than 26 years of age. The best results were achieved

by patients in their 30s. Patients older than 50 years, and even those older than 60 years, achieved better metabolic control than was observed in the younger group. On the basis of this analysis, one can indeed speculate that age may play a role in metabolic control. However, we concluded that increased age should not be regarded as an indicator of an inability to effectively utilize insulin pumps as a treatment option. Our conclusion is consistent with the results of both previously-mentioned studies.

Estimated Curve (Solid Line) and 95% Point wise Confidence Intervals (Dotted Lines)

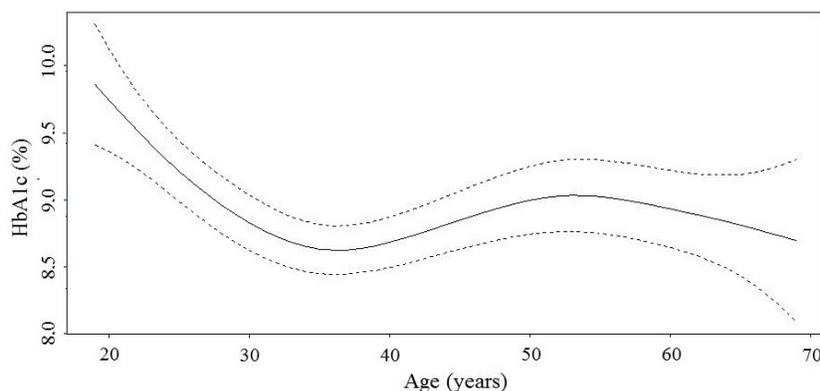


Figure 1. HbA1c level dependence on age

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J.B. designed and conducted the study, performed the analysis and wrote the manuscript. D.J.Ž., V.D., M.P., K.Š. and P.P. contributed to the design and conduct of the study, and revised the manuscript. M.B. was in charge of statistical analyses and analyzed this work, and revised the manuscript. M.K. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Author Disclosure Statement

The authors declare that no competing financial interests exist.

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