Dapagliflozin Transdermal Drug Delivery System – Clinical Results Phase 1 Conclusion

Authors: J. Meler, P.Biernat, M.Guziewicz, E.Micewicz, M.Dylinski

September 2023

Introduction

Transdermal drug delivery systems represent a promising advancement in the management of diabetes, offering significant benefits over traditional dosage forms. These systems provide patients with a straightforward and well-received method of drug administration by simply applying a patch to the skin. This approach ensures consistent delivery of medication at a predetermined rate, leading to improved glucose control and better predictability of the glucose profile.

Biotts' Innovative Approach to Diabetes Treatment

In the realm of diabetes treatment, Biotts is at the forefront of innovation with the development of a transdermal therapeutic system known as TTS MTC-D, which contains the active substance dapagliflozin. This system, in the form of a patch, releases the therapeutic substance at a controlled rate over a specified period, aiming to optimize treatment outcomes for individuals with type 2 diabetes mellitus. By incorporating dapagliflozin into the MTC-Y transdermal carrier within a reservoir patch design, Biotts is leveraging extended-release technology to enhance patient comfort and minimize side effects, particularly those related to the gastrointestinal tract often associated with polypharmacy.

Phase 1 Clinical Study

A pivotal phase 1 clinical study was conducted to evaluate the safety, relative bioavailability, and pharmacodynamic effects of the newly developed Dapagliflozin Transdermal System TTS MTC-D in healthy volunteers. The study design employed a randomized, crossover, open-label approach with a 2-way, 2-period setup at a single center. Subjects were either assigned to wear TTS MTC-D for seven days or receive daily oral doses of a reference treatment, Forxiga, for the same duration under fasting conditions. The study objectives encompassed assessing the relative bioavailability of the dapagliflozin transdermal delivery system, monitoring glucose levels in 24-hour urine collections, evaluating the safety and tolerability of TTS MTC-D, and measuring the levels of dapagliflozin and its metabolite 3-O-glucuronide in urine samples, along with determining the residual active substance content of TTS MTC-D.

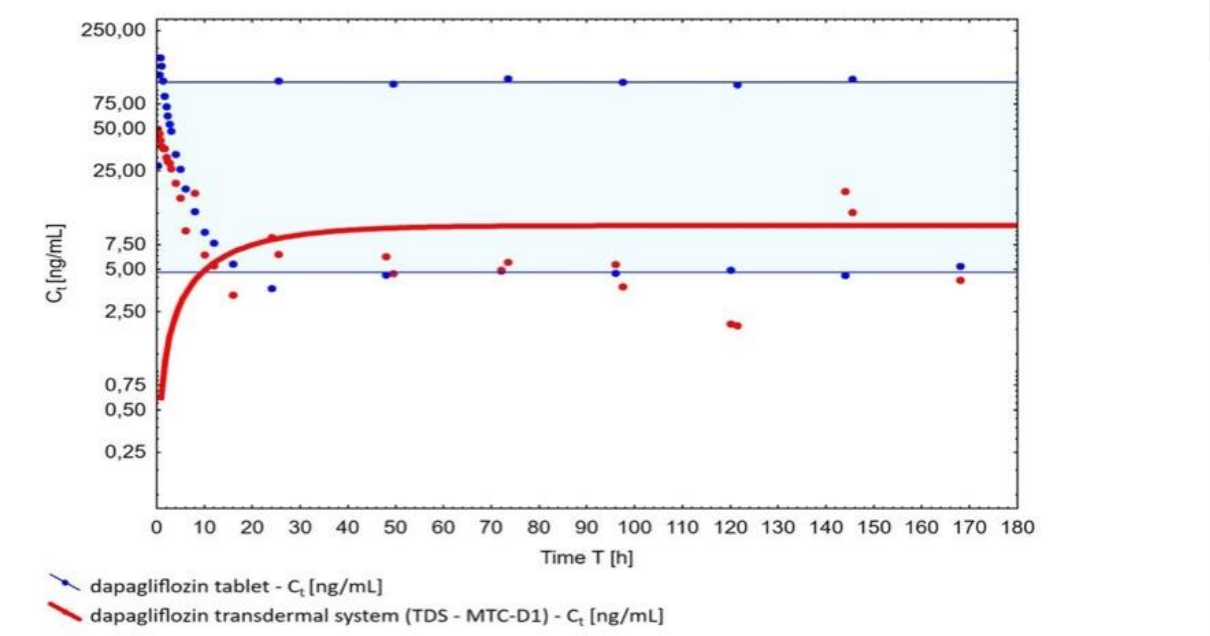

Fig.1 Comparison of oral and transdermal plasma dapagliflozin concentration

The clinical results with dapagliflozin in our MTC-Y technology compared to oral dapagliflozin are promising. Firstly, human data indicates the safety of the MTC-Y carrier, which is a crucial consideration. Secondly, blood concentration levels closely mirror those achieved with oral administration, suggesting that with continued formula refinement, a weekly patch could serve as a viable alternative to daily pills. This finding not only underscores the potential convenience for patients but also highlights the adaptability and versatility of the technology. Additionally, the pharmacokinetic profiles of both the study product and the reference product were found to be consistent, further validating the efficacy and reliability of our approach.

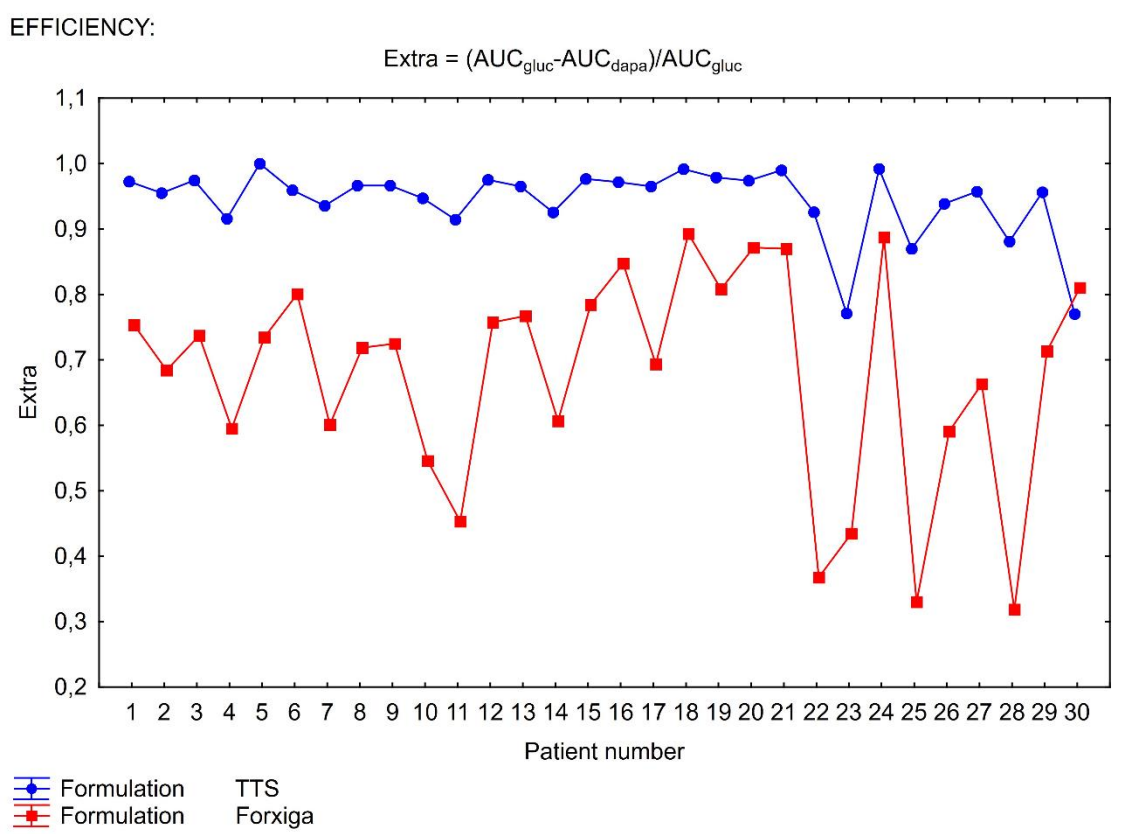

Fig.2 The values of EXTRA parameters were calculated and their mean values were compared with each other using Student's t-test for dependent samples.

Statistical analysis revealed that the transdermal therapeutic system (TTS) demonstrated a mean efficiency, as expressed by the EXTRA value, of 0.94 (94%), which was significantly higher compared to the efficiency calculated for Forxiga tablets, which stood at 0.68 (68%).

Conclusions

Following transdermal administration of the TTS MTC-D system developed by Biotts, dapagliflozin **successfully penetrated the skin barriers** and entered the bloodstream, showcasing the efficacy of the transdermal delivery method. The study findings indicated a high level of safety and tolerability of the study product, with predominantly mild to moderate adverse events reported. Furthermore, the clinical trial confirmed the effectiveness of the MTC-Y carrier in delivering dapagliflozin, reinforcing the safety and therapeutic benefits of Biotts' cutting-edge transdermal technology in the realm of diabetes care.