Clinical Evaluation of Lamotrigine and Levetiracetam Therapeutic Drug Monitoring in Pregnant Women with Epilepsy

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Background

The treatment of epilepsy during pregnancy is particularly risky, as the fetal and maternal risks associated with maternal seizures need to be balanced against the potential teratogenic effects of antiepileptic drugs. Pregnancy-induced pharmacokinetic variability makes drug dose adjustments necessary. Therapeutic drug monitoring (TDM) of lamotrigine and levetiracetam plays an important role in clinical decision-making during pregnancy. However, despite growing interest in TDM for these drugs, specific dose monitoring strategies for pregnant women are currently lacking. Therefore, this study aimed to clinically evaluate lamotrigine and levetiracetam TDM practice in pregnant women with epilepsy.

Methods

A retrospective observational study was conducted at Westmead Hospital in Sydney, Australia. Women who received epilepsy treatment with lamotrigine and/or levetiracetam before and/or during pregnancy were screened for inclusion. Eligible cases were selected through hospital dispensing records or via the outpatient clinic of the epilepsy unit. Patients were included if they (I) were > 18 years old and received levetiracetam and/or lamotrigine at Westmead Hospital between the study period of August 2019 and August 2023; (II) were treated for epilepsy before and during their pregnancy; (III) had therapeutic drug monitoring data available, including at least one lamotrigine or levetiracetam measurement before and/or during pregnancy; and (IV) had information on seizure control available in their electronic medical records. This study was approved by the Western Sydney Local Health District (WSLHD) Human Research Ethics Committee (no: 2023/ETH01806)

Results

Twenty pregnant patients were eligible for inclusion but only 11 patients could be included as no drug levels were collected in 9 patients. Pre-pregnancy target levels were available in only 3 patients. Routine TDM during pregnancy was recommended but often not performed. Furthermore, the dose adjustments seem provisional in most instances; without or before measuring drug concentrations, or before the results were known to the clinician. Additionally, over one-third (36.7%) of the levels were outside the therapeutic window among half (54.5%) of the patients, and half of the patients (45.6%) experienced seizures during pregnancy.

Conclusions

Overall, this study demonstrates that specific dose-monitoring strategies in pregnant women with epilepsy are currently lacking. This underlines the need for improvement in TDM practice.

Key words: lamotrigine, levetiracetam, pregnancy, therapeutic drug monitoring