Abstract: 1424

The diagnosis of non-adherence in hypertension using a urine biochemical screen is unaffected by drug pharmacokinetics

Authors:
D Lane1, R Alghamdi1, M Muscat1, MS Kaur1, T Davis1, R Cole1, P Patel1, M Tomaszewski2, P Gupta1,
1University Hospitals of Leicester NHS Trust, Department of Chemical Pathology and Metabolic Medicine - Leicester - United Kingdom of Great Britain & Northern Ireland, 2University of Manchester, Division of Cardiovascular Sciences, Faculty of Biology, Medicine and Health - Manchester - United Kingdom of Great Britain & Northern Ireland,

Topic(s):
Hypertension – Prevention

Citation:

Funding Acknowledgements:
None

Introduction: Suboptimal drug adherence in hypertension is pandemic and traditional diagnostic tools to detect non-adherence have lacked accuracy and robustness. The inability to identify non-adherence has therefore driven the development of biochemical drug screening by liquid chromatography tandem mass spectrometry (LC-MS/MS) in urine and blood, which are the most accurate metrics presently available. Urinary antihypertensive testing is evidenced to improve non-adherence rates, significantly decrease blood pressure after physician intervention, and be cost effective. The European Society of Cardiology (ESC) and European Society of Hypertension (ESH) 2018 guidelines have recommended the use of biochemical testing for non-adherence diagnosis. However, it has been argued that the variable pharmacokinetic parameters of the medication (such as their half-lives and clearance rates) may affect the detection of medications in urine and hence the determination of adherence. We hypothesized that pharmacokinetic parameters do not affect the detection of antihypertensive medications in urine.

Aim: This study compared the pharmacokinetic parameters of the most commonly prescribed antihypertensive medications against their detection in urine by LC-MS/MS.

Methods: Results of urinary drug screens from 463 hypertensive patients (total prescribed medications N = 1709) were collated. An adherence score termed as the C score (number of detected vs. prescribed medication) was generated for each of the 27 common antihypertensive medications. Pharmacokinetic parameters such as bioavailability, plasma concentration, volume of distribution, half-life, plasma clearance and urinary excretion values for each drug were obtained from published literature. Partial linear correlation was conducted between the C score of all the medications and each pharmacokinetic parameter studied.

Results: 40% of patients were non-adherent. The average number of prescribed medications was high (N = 3.7, SD: 1.5), and the average number of drugs detected was lower (N = 2.5, SD: 1.6). Amlodipine was the most prescribed (N = 224), and clonidine was the least (N = 10). The half-lives ranged from 0.87 to 39 hours for bumetanide and amlodipine respectively. The urinary excretion percentage varied from <1% for nifedipine, and 94% for benflurothiazide. No significant correlation was found between any drug C score and their respective pharmacokinetic variables such as the medication half-lives (figure1).

Conclusion: This study reports no significant correlation between drug pharmacokinetics and adherence. To the best of our knowledge this is the first study of its kind. Urinary biochemical testing by LC-MS/MS for non-adherence remains a valid tool for diagnosis although further detailed pharmacokinetic studies are needed to confirm this finding.
The diagnosis of non-adherence in hypertension using a urine biochemical screen is unaffected by drug pharmacokinetics.

**Aim:** This study compared the pharmacokinetic parameters of the most commonly prescribed antihypertensive medications against their detection in urine by LC-MS/MS.

**Methods:** Results of urinary drug screens from 463 hypertensive patients (total prescribed medications N = 1709) were collated. An adherence score termed as the C score (number of detected vs. prescribed medication) was generated for each of the 27 common antihypertensive medications. Pharmacokinetic parameters such as bioavailability, plasma concentration, volume of distribution, half-life, plasma clearance and urinary excretion values for each drug were obtained from published literature. Partial linear correlation was conducted between the C score of all the medications and each pharmacokinetic parameter studied.

**Results:** 40% of patients were non-adherent. The average number of prescribed medications was high (N = 3.7, SD: 1.5), and the average number of drugs detected was lower (N = 2.5, SD: 1.6). Amlodipine was the most prescribed (N = 224), and clonidine was the least (N = 10). The half-lives ranged from 0.87 to 39 hours for bumetanide and amlodipine respectively. The urinary excretion percentage varied from <1% for nifedipine, and 94% for benfro?umethiazide. No significant correlation was found between any drug C score and their respective pharmacokinetic variables such as the medication half-lives (figure1).

**Conclusion:** This study reports no significant correlation between drug pharmacokinetics and adherence. To the best of our knowledge this is the first study of its kind. Urinary biochemical testing by LC-MS/MS for non-adherence remains a valid tool for diagnosis although further detailed pharmacokinetic studies are needed to confirm this finding.

![The effect of drug half-life on adherence score](image-url)