

THE EFFECT OF ANTIHYPERTENSIVE DRUGS ON ESTIMATED GLOMERULAR FILTRATION RATE OF HYPERTENSIVE PATIENTS DURING FOLLOW-UP

A.PTINOPOULOU¹, M.PIKILIDOU¹, I.TZIOLAS¹, A.B.HAIDICH², P.ZEBEKAKIS¹, A.LASARIDIS¹

¹1st Department of Internal Medicine, AHEPA University Hospital, Thessaloniki, GREECE

²Department of Hygiene and Epidemiology, School of Medicine, Aristotle University of Thessaloniki, GREECE

Objective

The aim of the present study was to investigate longitudinally the effect of antihypertensive drugs on estimated glomerular filtration rate (eGFR) in a hypertensive population.

Methods

This retrospective study consisted of **779** hypertensive adult patients (240 males) of an outpatient hypertension clinic that were **followed up for three to twenty years (median (IQR) 6.9 (4.45, 10.23))** and received combination treatment. Age, systolic blood pressure (SBP) and drugs used were recorded for each patient at each visit. The **antihypertensive drugs** were **categorized into the following six classes: angiotensin converting enzyme inhibitors (ACEi), angiotensin receptor blockers (ARBs), calcium channel blockers (CCBs), diuretics, beta-blockers, and other drugs**, which included centrally acting drugs and alpha-blockers. Patients with diabetes were excluded from the study. Estimated GFR values were calculated using the simplified Modification of Diet in Renal Disease formula (MDRD). **Repeated measures analysis** using a **mixed effects model** was applied in order to investigate the continuous effect of drugs on eGFR within and between patients.

Results

Table 2. A) Analysis including all drug categories. B) analysis including only significant drug categories.

	A) all drug variables			B) only significant drug categories		
	<i>β</i> -estimate	SE	p-value	<i>β</i> -estimate	SE	p-value
GENDER	-7.6089	1.1302	<0.0001	-7.5014	1.1295	<0.0001
AGE	-0.5697	0.0532	<0.0001	-0.5366	0.0508	<0.0001
SBP	-0.0333	0.0207	0.1073	-0.0347	0.0206	0.0930
ACEI	0.0720	0.2008	0.7200			
ARB	0.5376	0.2566	0.0363	0.6709	0.2339	0.0042
CCB	0.3965	0.1871	0.0343	0.4225	0.1806	0.0194
DIURETIC	0.2777	0.2034	0.1723			
B-BLOCKER	0.4152	0.1896	0.0286	0.5016	0.1761	0.0044
OTHER DRUGS	-0.2320	0.3664	0.5267			

A **complete case analysis** was performed **after adjusting for age, gender and SBP**. Non-significant drug variables were excluded in the final statistical model.

Conclusions

ARBs, CCBs and beta-blockers were found to have a protective effect on renal function that was beyond the lowering of blood pressure. The results of this analysis imply that outpatient records can be useful in estimating the effect of drug treatment on renal function in the variability of real world settings, when appropriate statistical techniques are used.

References:

- Delaney JA, Moodie EE, Suissa S. Validating the effects of drug treatment on blood pressure in the General Practice Research Database. *Pharmacoepidemiol Drug Saf* 2008;17:535-545.
- Holden JE, Kelley K, Agarwal R. Analyzing change: a primer on multilevel models with applications to nephrology. *Am J Nephrol* 2008;28:792-801.

Table 1. Descriptives and clinical characteristics of the 779 subjects at baseline

Age (years)	57.7±9.7
Gender	
male (%)	31%
female (%)	69%
SBP (mmHg)	150±15
DBP (mmHg)	90±9
MAP (mmHg)	110±9
Serum creatinine (mg/dl)	0.93±0.18
MDRD (ml/min/1.73m ²)	76±17

Data show average±standard deviation or percentages.

SBP = Systolic Blood Pressure, DBP = Diastolic Blood Pressure, MAP = Mean Arterial Pressure, MDRD = Modification of Diet in Renal Disease formula

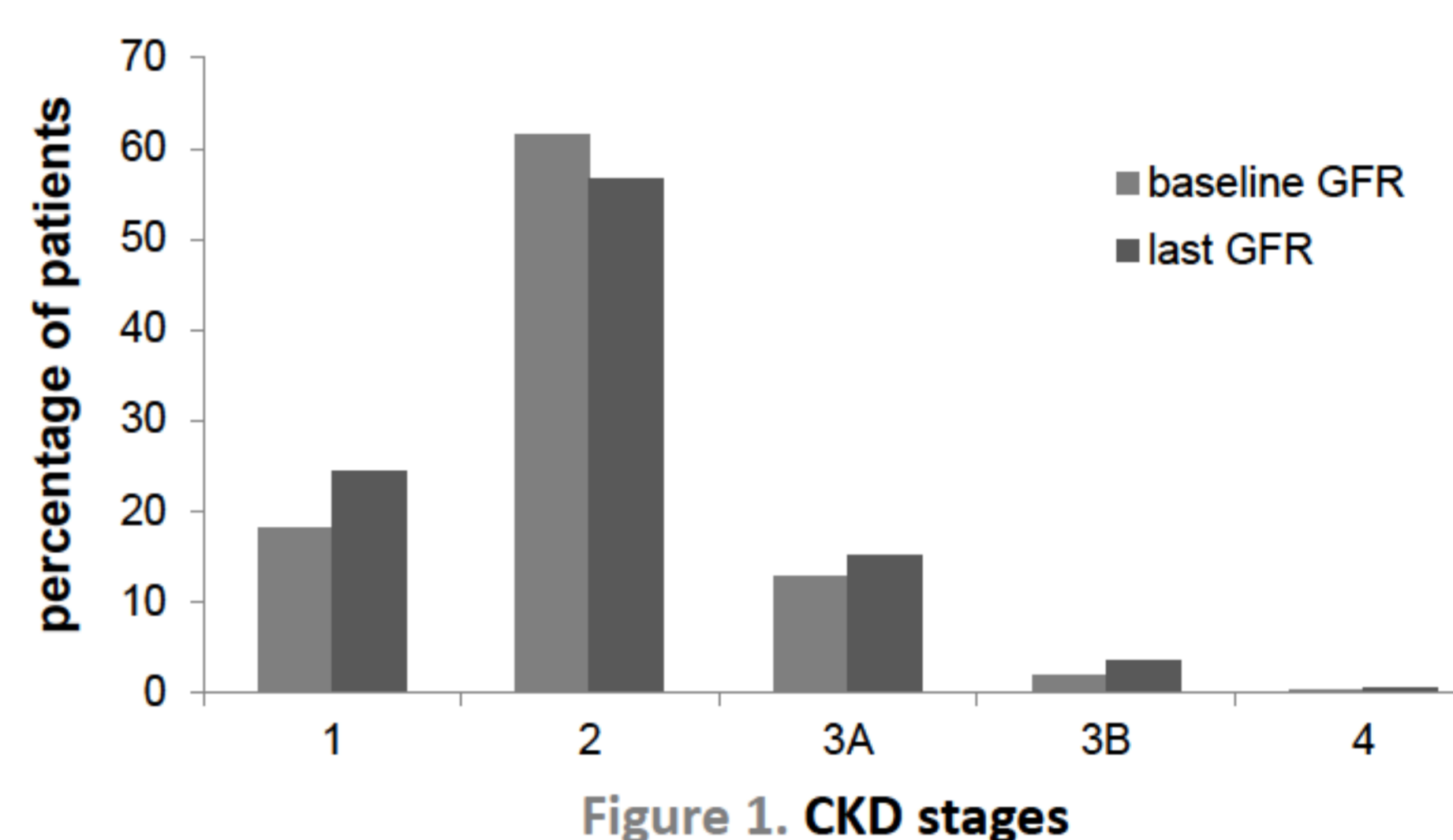


Figure 2. The effect of antihypertensive drugs on eGFR mixed effects model – error bars graph

