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Rates of polypharmacy among patients with type 2 diabetes mellitus in Greece

The treatment of type 2 diabetes mellitus (T2DM) is characterized by the combination of multiple antidiabetic agents, including insulin treatment, and medications for the comorbidities that are common in patients with DM.[1,2] Polypharmacy is therefore a common problem in patients with DM and may be a significant barrier to the achievement of glycemic control.[1,2] In addition, it is well known that polypharmacy has various harmful effects, including adverse drug reactions[3] and interactions between drugs,[4] and, the most frequent, that of non-adherence to the therapeutic plan.[5] As in Greece data on polypharmacy among patients with DM are scarce, the present study was conducted to estimate the extent of polypharmacy among patients attending a diabetic outpatient clinic.

The study was conducted from January to May 2014 and included 205 patients with T2DM who were attending the outpatient diabetic clinic of a general hospital [98 women/107 men, mean age (±standard deviation, SD) 64.1±11.9 years, mean HbA_{1c} 7.5±1.5]. The information retrieved from the patients' medical files included age, sex, HbA_{1c}, and comorbidities. Only long-term medications administered orally, by inhalation or in the form of eye drops, and given for at least 1 month prior to data collection, were recorded for each patient. The medications were regrouped into drug classes. Two categories of polypharmacy were determined: Polypharmacy defined as >5 drugs/day and polypharmacy defined as >7 drugs/day.[6] Statistical analysis was performed using programs available in the SPSS Statistical Package of Social Sciences (SPSS) (SPSS, Chicago, IL, USA). Logistic regression analysis determined the independent variables affecting polypharmacy >5 drugs. P<0.05 (two-tailed) was considered statistically significant.

The man rates of polypharmacy >5 drugs and polypharmacy >7 drugs were 79% and 54.1%, respectively. Of the 205 study patients, 83.9% were on oral antidiabetic medications (OAM) and 48.8% on insulin treatment. The majority of study patients were on antihypertensive (96.6%) and lipid lowering medication (71.2%), followed by antiplatelet drugs (47.3%), H_2 blockers and proton-pump inhibitors (22.4%), benzodiazepines (14.6%) and levothyroxine (12.2%) (tab. 1). The number of drugs per patient was 1–13, mean 6.6±2.5. Regarding OAM, the number of drugs per patient was 1–4, mean 1.7±1.1. Regarding antihypertensive medication, the number of drugs per patient was 1–6, mean 2.1±1.5. Only two independent variables for polypharmacy >5 drugs were found: Age [odds ratio (OR): 1.06, 95% confidence interval (CI): 1.03–1.09, p<0.001] and OAM (OR: 2.59, 95% CI: 1.15–5.83, p=0.02). No significant associations were found between polypharmacy >5 and sex, HbA_{1c}, duration of T2DM, body mass index (BMI) and insulin therapy.

The rates of polypharmacy among patients with T2DM in Greece are high. This finding is consistent with those of previous studies showing that T2DM increases the risk of polypharmacy.[1,2] One study in primary care including 102 patients showed lower rates of polypharmacy; 45% of the patients with T2DM were receiving up to 6, 36% 7–9 medications, and 19% more than 10 medications.[7] As in the present study, arterial hypertension was the main comorbidity.[7] Studies in the general population have shown lower rates of polypharmacy.[8,9] In the 2004 National Nursing Home Survey conducted in the USA, 40% of the patients in nursing homes consumed at least 9 different drugs per day,[8] while a study in Europe showed that 51% of the older population took at least six drugs per day.[9]

It is known that DM *per se* and age are both related with high rates of polypharmacy.[10] A study in the USA confirmed the high rates of polypharmacy among patients with T2DM, emphasizing the finding that polypharmacy was related with poor glycemic control.[11] In the present study, despite the high rates of polypharmacy no association with poor glycemic control was found. In a study in the early 2000s a higher mean number of OAM (4.1±1.9) was reported than observed in the present study.[12] This can be explained by the fact that currently fixed-dose combination

Table 1. Rates consumption of main drug classes among patients with type 2 diabetes mellitus (n=205).

Drug groups	Rate (%)	Drug groups	Rate (%)
Antidiabetic drugs		*Other drug groups*	
Sulfonylurea	17.6	Statins	71.2
Metformin	80.0	Fibrates	4.4
Dipeptidyl peptidase-4 (DPP-4) inhibitors	37.1	Omega 3 fatty acids	3.9
Metformin+DPP-4 inhibitors	28.3	H_2 blockers and proton-pump inhibitors	22.4
Pioglitazone	1.0	Antiplatelet drugs	47.3
Metformin+pioglitazone	0.5	Anticoagulants	4.4
Glp-1 analogues	10.7	Antiarrhythmic drugs	2.4
Insulin	48.8	Nitrates	3.4
Antihypertensive drugs		Benzodiazepines	14.6
Angiotensin-converting-enzyme (ACE) inhibitors	25.4	Neuroleptics	7.8
Angiotensin II receptor antagonists (ARBs)	41.5	Serotonin-specific reuptake inhibitor (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs)	6.3
Diuretics	34.6		
Beta-blockers	30.7	Non-benzodiazepine sleeping pills	2.0
Alpha-agonists	3.9	Anti-Parkinsonian drugs	2.4
Calcium channel blockers (CCBs)	29.8	Acetylcholinesterase inhibitors and memantine	0.5
Furosemide	8.3	Levothyroxine	12.2
ACE inhibitors+diuretics	6.3	Steroids	1.0
ACE inhibitors+CCBs	4.4	Bisphosphonates	0.5
ARBs+CCBs	1.0	Medical eye drops	0.5
ARBs+diuretics	19.0	Iron therapy	2.0
ARBs+CCBs+diuretics	2.4	Long-term use of inhalations	4.9

therapy is preferred for the treatment of T2DM. Similarly, a low mean number of prescribed drugs was observed in this study for the treatment of hypertension in contrast to previous findings showing a higher mean number of anti hypertensive medications per day.[13]

In conclusion, patients with T2DM in Greece show high rates of polypharmacy, with unknown implications for the achievement of therapeutic targets, especially for arterial hypertension and DM. Despite the use of fixed-dose combination therapy, high rates of polypharmacy may have harmful implications for the adherence of these patients to their treatment that need further investigation.

ΠΕΡΙΛΗΨΗ

Πολυφαρμακία σε άτομα με σακχαρώδη διαβήτη τύπου 2 στην Ελλάδα

Α.Κ. ΠΑΠΑΖΑΦΕΙΡΟΠΟΥΛΟΥ, Α. ΚΟΥΤΣΟΒΑΣΙΛΗΣ, Σ. ΠΑΠΠΑΣ, Σ. ΜΠΟΥΣΜΠΟΥΛΑΣ

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A.K. Papazafiropoulou, A. Koutsovasilis, S. Pappas, S. Bousboulas

Third Department of Internal Medicine and Center of Diabetes,
"Agios Panteleimon" General Hospital of Nikaia, Piraeus, Greece

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Corresponding author:

A.K. Papazafiropoulou, 3rd Department of Internal Medicine and Center of Diabetes "Agios Panteleimon" General Hospital of Nikaia, 3 D. Mantouvalou street, GR-184 54 Nikaia, Greece
Tel.: +30 213 207 2662, Fax: +30 213 2076404,
e-mail: pathan@ath.forthnet.gr