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Diabetes medication persistence, different medications have different persistence rates

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ABSTRACT

Aim: To assess the persistence of diabetic patients to oral medications.**Methods:** The study included all type 2 diabetic patients over 40 years, members of one District of Clalit Health Services Israel, who were diagnosed with diabetes mellitus before 2008 and who filled at least one prescription per year during 2008–2010, for the following medications: metformin, glibenclamide, acarbose, statins, angiotensin converting enzyme inhibitors (ACEI) and angiotensin II receptor antagonists (ARBs). Purchase of at least 9 monthly prescriptions during 2009 was considered “good medication persistence”. We compared HbA1c and LDL levels, according to medication persistence, for each medication; and cross persistence rates between medications.**Results:** 21,357 patients were included. Average age was 67.0 ± 11.0 years, 48.9% were men, and 35.8% were from low SES. Good medication persistence rates for ARBs were 78.8%, ACEI 69.0%, statins 66.6%, acarbose 67.8%, metformin 58.6%, and glibenclamide 55.3%. Good persistence to any of the medications tested was associated with a higher rate of good persistence to other medications. Patients who took more medications had better persistence rates.**Conclusions:** Different oral medications used by diabetic patients have different persistence rates. Good persistence for any one medication is an indicator of good persistence to other medications. Investment in enhancing medication persistence in persons with diabetes may improve persistence to other medications, as well as improve glycemic control.

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1. Introduction

Poor adherence with medication and the associated adverse outcomes and high costs of care are of growing concern to clinicians and healthcare systems [1]. A study of the general

population in Germany found that at least 33% of patients repeatedly fail to follow their doctors' recommendations and only 25% described themselves as fully adherent [2].

In the management of diabetes mellitus, medication persistence is of the utmost importance. Yet, a systematic review

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confirmed that many patients with diabetes utilize less than the prescribed amount of oral anti-glycemic drugs, with adherence rates ranging from 36–93% [3]. For persons with diabetes, better adherence has been associated with better patient outcomes [4,5] reduced hospitalizations, and reduced health care costs [6,7]. Every 25% increase in medication adherence was found to be associated with a 0.34% reduction in glycosylated hemoglobin (HbA1c) [8]. Medication adherence refers to the degree or extent of conformity to the recommendations about day-to-day treatment by the provider with respect to the timing, dosage, and frequency. Medication persistence on the other hand refers to the act of continuing the treatment for the prescribed duration [9]. Israel has a universal health system with good and accessible primary care for all patients and generous coverage. We investigated persistence with oral medications commonly used by diabetic patients, in a cohort of diabetic patients in our district.

2. Methods

The study was conducted in the Central District of “Clalit Health Service” (CHS) in Israel, and was approved by the local ethics committee (approval number k118/2010). In Israel, since 1995, every citizen and permanent resident receives health care provided one of four health maintenance organizations (HMO). CHS is the largest HMO in Israel, serving 54% of the population. Patient medical records in CHS have been completely computerized for over a decade and an extensive healthcare database has been created. The demographic data is updated directly from the population registry of the Ministry of Interior. All laboratory tests are free of charge and sent to a central laboratory. The results are recorded automatically in patients' electronic medical files and reported directly to primary care physicians. All community pharmacies used by CHS are computerized and report to one central repository. CHS issues medications and requires nominal co-payments. Patients can buy chronic medications for up to 3 months at a time. This system ensures that all prescriptions are documented.

2.1. Study population

All persons over age 40 years who were diagnosed with type 2 diabetes mellitus before 2008 and were treated by the same family physician during 2008–2010 in the Central District of CHS. From this cohort we choose patients that filled at least one prescription per year in the three consecutive years 2008–2010 for the specific study medication. This approach was used to ensure medication use and to exclude patients with changes in treatment for any reason during the study period.

2.2. Study medications

The following medications were included: metformin, glibenclamide (the most commonly used sulfonylurea in Israel during the study period), acarbose, statins, angiotensin converting enzyme inhibitors (ACEI), and angiotensin II receptor antagonists (ARBs).

Table 1 – Characteristics of the 21,357 study patients.

Age (years) mean (SD) (range)	67.0 ± 11.0 (40–100)
Gender (% men)	48.9%
Low socioeconomic status	35.8%
BMI (kg/m ²) mean (SD) (range)	30.2 ± 5.5 (13.4–60.6)
Smoking (current or past)	33.4%
Hypertension	76.8%
Hyperlipidemia	88.5%
Ischemic heart disease	32.5%
s/p CVA	12.8%
HbA1c (%) mean (SD) (range)	7.4 ± 1.4 (4.3–17.8)
LDL cholesterol (mg%) mean (SD) (range)	90.0 ± 28.8 (20–220)
Systolic BP (mm Hg) mean (SD) (range)	131.7 ± 16.1 (80–240)
Seen by endocrinologist in the year 2009	14.0%

We analyzed all prescriptions that were filled for the six medications from January 1st 2009 to December 31st 2009 [10]. We considered purchasing of at least 9 monthly prescriptions during 2009 as “good medication persistence”, as compared to lower persistence (purchasing of less than 9 prescriptions during 2009) [11,12].

Demographic information was accessed: age, gender and socio-economic status (SES). Patients with low SES were defined as those exempt from healthcare payments on their income by the national insurance. These patients pay reduced co-payments on chronic medications and these co-payments are capped at \$60 a month. Patients who immigrated to Israel after 1990 were considered as new immigrants. We also extracted data about body mass index (BMI), smoking and other cardiovascular diagnoses at 1st January 2009 and visits to endocrinologist. We included the last LDL-cholesterol (LDL) HbA1c levels, and blood pressure measure that were taken in 2009.

2.3. Statistical analysis

We calculated persistence rates for each medication separately. For each medication we used logistic regression models to calculate odds ratio and to examine associations between medication persistence and age, gender, SES, immigration status, BMI, chronic diseases, insulin use, endocrinology clinic visits and the number of the investigated medications used by each patient as a proxy to overall medications use. We compared HbA1c and LDL cholesterol levels (separately) between persons with good and lower persistence for each medication, and cross persistence rates between medications, by comparing medication persistence for other medications.

STATA 8.0 statistical software (Stata Corp. College Station, TX, USA) was used for statistical analysis.

3. Results

The study included 21,357 individuals. Table 1 describes their baseline characteristics. Rates of good medication persistence varied widely among the medications investigated, ranging from 55.3% for glibenclamide to 78.8% for ARBs (Fig. 1). Good medication persistence to any of the six medications investigated was associated with a higher rate of good persistence to each other medication (Table 2).

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