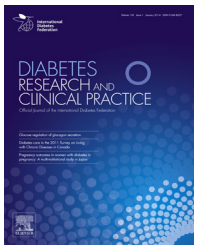
Contents available at ScienceDirect

Diabetes Research and Clinical Practice

journal homepage: www.elsevier.com/locate/diabres

International Diabetes Federation



Brief Report

Factors associated with adherence to oral antihyperglycemic monotherapy in patients with type 2 diabetes mellitus in the United Kingdom☆

Kaan Tunceli *, *Kristy Iglay*, *Changgeng Zhao*, *Kimberly G. Brodovicz*, *Larry Radican*

Merck & Co., Inc., Kenilworth, NJ, USA

ARTICLE INFO

Article history:
Received 21 April 2015
Received in revised form
4 May 2015
Accepted 5 May 2015
Available online 14 May 2015

Keywords:
Adherence
Drug therapy
Logistic regression analysis
Observational study
Oral antihyperglycemic agents
Type 2 diabetes mellitus

ABSTRACT

To evaluate adherence to oral antihyperglycemic monotherapy, we conducted a retrospective cohort study of a UK clinical database. The mean proportion of days covered was 73.5%, and 60.1% of patients were adherent. Younger age and fewer concomitant medications were negatively associated with the likelihood of being adherent.

1. Introduction

Type 2 diabetes mellitus (T2DM) is a formidable health challenge in the United Kingdom. Approximately 3 million (6.0%) UK residents have been diagnosed with T2DM, and the National Health Service allocates 10% (£10 billion) of its annual budget to T2DM care [1].

Treatment with oral antihyperglycemic agents (OAHAs) can decrease the risk of diabetes complications. However, only 58% of T2DM patients are adherent to OAHA regimens [2]. Consequences of poor OAHA adherence include reduced metabolic control, as well as increased mortality, morbidity, and long-term health resource utilization [3–7].

Patients enrolled in randomized controlled trials (RCTs) might be more adherent than the general population because

☆ Selected data were presented September 16, 2014, at the 50th Annual Congress of the European Association for the Study of Diabetes (EASD), Vienna. Poster Session 007, Presentation #322.

* *Corresponding author at*: Outcomes Research, Center for Observational and Real World Evidence (CORE), Merck & Co., Inc., Mailstop UG-2A-32, Office UG-2A026, 351 North Sumneytown, North Wales, PA 19454-2505, USA. Tel.: +1 267 305 0789; fax: +1 267 305 0860.
E-mail address: kaan_tunceli@merck.com (K. Tunceli).

http://dx.doi.org/10.1016/j.diabres.2015.05.031

RCT subjects might be more conscientious about taking their medications, in order to meet stringent follow-up requirements implemented in the RCTs. Observational cohort studies can provide better insight into "real-world" adherence rates. Equipped with data from such studies, physicians may be better able to proactively identify individuals at increased risk of OAHA nonadherence.

Recent data on OAHA nonadherence in the UK are limited. In the Diabetes Audit and Research in Tayside, Scotland (DARTS), study conducted in the 1990s, 31% of patients using sulfonylurea (SU) and 34% of those using metformin (MET) monotherapies were adherent [8].

Objectives of the present observational study were to estimate adherence to OAHA monotherapy, and identify factors associated with adherence, in British adults with T2DM.

2. Methods

This retrospective cohort study evaluated the IMS Disease Analyser–MediPlus™ electronic-medical-record (EMR) database, which includes ~1 million active deidentified patient records from 560 primary-care practices. The index date (ID) was defined as the date of the first prescription for OAHA monotherapy between 1/1/2009 and 6/30/2012 (Fig. 1).

Eligible patients were aged ≥18, had medical coverage during the 12 months preceding and following ID, and had an International Classification of Diseases, 10th Revision (ICD-10), reimbursement code for T2DM (E11) and ≥1 prescription for monotherapy with MET, SUs, thiazolidinediones, or dipeptidyl peptidase-4 inhibitors. Excluded were patients who had ICD-10 codes for T1DM (E10), switched daily dosing frequencies, or added other OAHAs. To assess adherence, the proportion of days covered (PDC) was computed for each patient over 12 months of follow-up:

$$\text{PDC} = \frac{\text{No. of days with drug supplied during the observation period (OP)}}{\text{No. of days during OP}(365)} \times 100.$$

Adherent patients were defined as having PDC ≥ 80%, and were stratified by age, gender, and number of concomitant medications (con-meds). Con-meds included diuretics, other antihypertensive or cardiac medications, antiplatelet agents, and medications for dyslipidemia, and were categorized as 0, 1–2, or ≥3 medications. A multivariate logistic regression analysis evaluated baseline characteristics associated with being adherent at follow-up.

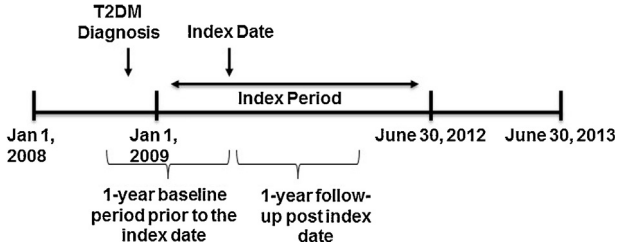


Fig. 1 – Study design and timeline.

3. Results

Most patients were aged ≥65 (51.5%) and/or used: MET (81.0%), twice-daily OAHA regimens (82.9%), and/or ≥3 con-meds (58.1%; Table 1).

The mean PDC was 73.5%, and 39.9% of patients were nonadherent (PDC < 80%). Adherence was significantly higher in patients aged ≥65 ($P < 0.0001$ vs. younger ages) and in those prescribed ≥3 con-meds ($P < 0.03$ vs. 0 or 1–2; Fig. 2).

Patients aged < 45 (odds ratio [OR] = 0.54; 95% confidence interval [CI] = 0.44–0.67), and those aged 45–64 (OR = 0.81; 95% CI = 0.72–0.90), were significantly less likely to be adherent compared to individuals aged ≥65 years (Fig. 3). Also

Table 1 – Baseline demographic and clinical characteristics.

Variable	Overall (N = 6276)	
	N	%
Age group (years)		
<45	441	7.0
45–64	2604	41.5
≥65	3231	51.5
Gender		
Female	2696	43.0
Male	3580	57.0
Concomitant medications		
0	559	8.9
1–2	2073	33.0
≥3	3644	58.1
Oral antihyperglycemic agents[a]		
Metformin	5086	81.0
TZDs	46	0.7
SUs	980	15.6
DPP-4Is	12	0.2
Others	152	2.4
Dosing frequency		
Once-daily	1076	17.1
Twice-daily	5200	82.9
Comorbidities[b]		
Cerebrovascular disease	302	4.8
Congestive heart failure	126	2.0
Chronic pulmonary disease	817	13.0
Dementia	62	1.0
Diabetes with complications[c]	1145	18.2
Malignancy	279	4.4
Myocardial infarction	212	3.4
Mild liver disease	63	1.0
Peripheral vascular disease	354	5.6
Renal disease[c]	787	12.5

[a] Some percentages do not sum to 100 because of rounding.
[b] Selected comorbidities (not all patients had one of these disorders).
[c] Each of these variables corresponded to different International Classification of Diseases, 10th Revision (ICD-10) codes. However, they are not mutually exclusive, because one patient could have both diagnosis codes. Abbreviations: DPP-4Is, dipeptidyl peptidase-4 inhibitors; SUs, sulfonylureas; TZDs, thiazolidinediones.