Original Article

CONSUMPTION ANALYSIS OF METFORMIN, SULFONYLUREAS, AND OTHER ANTIDIABETICS DRUGS IN MOROCCO (1991-2005)

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ABSTRACT

Objective: Type 2 Diabetes is one of the chronic diseases with a high prevalence and consequently a substantial socio-economic burden in Arab countries. In this paper, we evaluated the antidiabetic drugs consumption in Morocco during the period of 1991 to 2005, drug classes used and the effect of major studies on the consumption of the biguanides.

Methods: We used sales data from the subsidiaries of the Intercontinental Marketing Service Health. The consumption volume was converted to Defined Daily Dose (DDD).

Results: During 1991-2005 antidiabetic drugs consumption increased from 1.37 to 4.22 DDD/1000 inhabitants/day. In 2005 the sulfonylureas were the most consumed 2.96 DDD/1000 inhabitants/day) followed by the Biguanides (1.06 DDD/1000 inhabitants/day) and glinides 0.1 DDD/1000inhabitants/day. The largest consumption share in volume was held by sulfonylureas 72.22%, followed by the biguanides 22.22%.

Conclusion: This study documents progressive changes in the consumption of antidiabetic's between 1991-2005 in Morocco. However, the significant increase in the utilization of antidiabetic's drugs is not the result of increased adherence but of increased patient number, since the use of metformin as first line therapy was still suboptimal and influenced by different studies as the Campbell and UKPDS study.

Keywords: Defined Daily Dose, Consumption, Metformin, Sulfonylureas, Antidiabetic

INTRODUCTION

Diabetes represents a major public health problem in Morocco as they do in both the industrialized and the developing countries. It is widely considered one of the world's largest human health problems, as documented by its growing prevalence [1, 2]. In addition, more than 240 million people worldwide are estimated to have diabetes, and this is likely to pass 360 million by 2030 [3].

The main therapeutic goals for the treatment of type 2 diabetes mellitus are to enhance insulin secretion and lower systemic glucose; an increased blood glucose level is associated with a greater risk of microvascular and macrovascular complications. It has been reported that macroangiopathy can affect up to one-third of patients diagnosed with type 2 diabetes [4]. Diabetic patients require multiple interventions to reduce their risk of microvascular and macrovascular complications. These complications not only diminish the health of the patients and may disable them but also put a high financial burden on the healthcare system. The United Kingdom Prospective Diabetes Study clearly proved the benefits of intensive glycemic control in patients with type 2 diabetes [5]. Previous studies have shown that increased adherence to oral antihyperglycemic drugs (OAHDs) results in better metabolic control and, consequently, in decreased hospitalization rates and lowered total annual healthcare costs [6, 7]. Moreover, a systematic review of 20 reports showed that adherence to OAHD therapy varied widely, ranging from 36% to 93% [8].

In most Arab countries, including Morocco, the prevalence of diabetes was 6.6% and was similar for males and females [9]. The majority of diabetes patients are predominantly managed and treated by general practitioners and diabetologists. Today's clinicians are presented with an extensive range of oral antidiabetic drugs for type 2 diabetes.

The main aim of the present study was to describe trends in the use of antidiabetic's medications within and across different therapeutic classes using nationally representative data from 1991 to 2005, and to have an idea about the consumed antidiabetic's drugs and the effect of major studies on the consumption of biguanides.

MATERIALS AND METHODS

We used sales data from the Moroccan subsidiary of Intercontinental Marketing Service Health (IMS Health), these data are for the drugs sold by private pharmacists or 90% of the global pharmaceutical consumption in Morocco. IMS Health conducts surveys of the market share and the volume of sales expressed in units. The collection of the data is essentially made from indirect sources, monthly from the pharmaceutical wholesalers and from direct sources and quarterly from pharmacies. The study involved the main antidiabetic classes with their Anatomical Therapeutic Chemical system (ATC). Data from IMS sales in units were converted to DDDs/1000 Inhabitants per day (DDD/1000 Inhabitants/day = [Number of DDD/Number of days * Number of inhabitants]*1000), the simplest and most accessible unit of measurement among the different methods of measuring consumption of drugs [10], normalized and validated by the World Health Organization (WHO). This unit of measurement allows comparisons at the international level by eliminating the difficulties associated with the heterogeneity of dosage forms, presentations, and dosages of drugs across countries. For the calculation of the DDDs, we have used the values in DDD proposed by the WHO, assigned to each dosage form of a drug, which is "an estimate of the maintenance's average dose per day for a drug used for its main indication for an average adult." Thus, for each drug of the ATC, a daily dose is given the value of a DDD. In this study, we used the ATC system version of the European Pharmaceutical Market Research Association [11].

RESULTS

During the study period from 1991 to 2005, the total consumption of antidiabetic's went from 1.37 to 4.22 DDD/1000 inhabitants/day

(DID), in 2005 the sulfonulyreas was the most consumed 2.96 DID for each one, followed by the short acting Biguanides 1.06 DID. The consumption of other classes of drugs namely the glinides and inhibitor of alpha-glucosidase witnesses a much slower evolution. However, there was a much slower evolution of other classes such as glinides glitazones as shown in (table 1).

Table 1: Evolution of consumption in DID of the different families of antidiabetic drugs

	1991		2000		2005	
	DID	%	DID	%	DID	%
Sulfonylureas	1.061	77.05	2.598	80.284	2.969	61.46
Glinides	-	-	-	-	0.102	6.25
Glitazones	-	-	-	-	0.011	3.12
Biguanides	0.316	22.95	0.563	17.399	1.065	22.92
Alpha-glucosidade inhibitors	-	-	0.075	2.317	0.081	6.25
∑	1.377	100%	3.236	100%	4.229	100%

DID: DDD/1000 Inhabitants/Day

In 2005 the most consumed products were the sulfonylureas 2.96 DID follow by biguanides 1.06 DID and the alpha-glucosidase inhibitors 0.08 DID. We most note that during the period of our study, new drugs have been introduced into the market and became the most widely consumed in Morrocco for 2005 as shown in (table 2).

Table 2: Consumption trends of antidiabetic drugs in international non–proprietary name (INN)

Classes/INN	ATC	1991	2000	2005
Sulfonylureas		1.061	2.598	2.969
Glimepiride	A10BB12	-	0.213	0.815
Gliclazide	A10BB09	0.35	0.948	0.876
Glibenclamide	A10BB01	0.44	1.191	1.122
Glipizide	A10BB07	0.11	0.16	0.108
Gliquidone	A10BB08	-	0.046	0.034
Carbutamide	A10BB06	0.11	0.031	0.01
Chlorpropamide	A10BB02	0.01	0.006	0
Tolbutamide	A10BB03	0.05	0	0
Glitazones				
Roziglitazone	A10BG02	-	-	0.011
Biguanides				
Metformin	A10BA02	0.31	0.563	1.065
Alpha-glucosidase inhibitors				
Acarbose	A10BF01	-	0.075	0.081

INN: International Non–proprietary Name/ATC: Anatomical, Therapeutic and Chemical classification/DID: DDD/1000 Inhabitants/Day
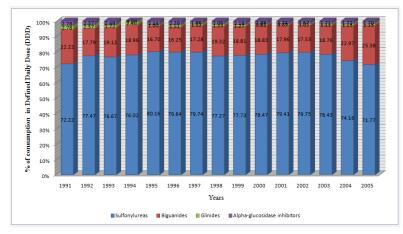

Fig. 1: Consumption trends segmentation of antidiabetic drugs in Defined Daily Dose (DDD)

Similarly the number of antidiabetic commercials specialties in Morocco from 6 in 1991 to 16 in 2005. In 1991 antidiabetic consumption, in DDD was represented by the sulfonylureas 72.22%, biguanides 22.22%, glinides 2.22% and inhibitor of alpha-glucosidase 2.22%, but in 2005, it was 71.77% for the sulfonylureas, 25.38 for biguanides, 1.72% for the inhibitor of alpha-glucosidase and 1.15% for glinides as shown in (fig. 1).

The evolution of the consumption of oral antidiabetic drugs during this period of study is influenced by major studies on prescribing the drug and publishing the results of these randomized studies have involved oral medications in evaluating their influence on consumption of metformin compared with other oral antidiabetic agents. We will mention the most important for the most prescribed families.
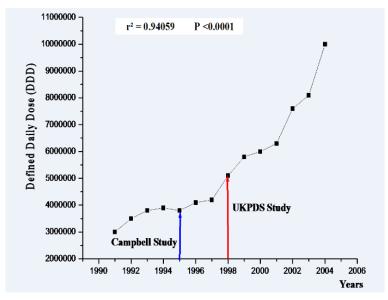
Fig. 2: Effect of studies on the consumption of metformin in defined daily dose (DDD)

The increase in the number of DDD of metformin during this period was influenced by the results of UKPDS and Campbell study from 1995 to 1998 as shown in (fig. 2).

DISCUSSION

The diabetes management includes many areas that may be influenced by the patient severity. Moreover, the antidiabetic drug market is characterized by a number of new drugs that have been introduced during the period of this study, but this the first study that analyzes antidiabetic drugs consumption in Morocco. From 1999 to 2005, the consumption of antidiabetic drugs during this period has significantly increased in Morocco, with a predominance of sulfonylureas and biguanides but small change for other drugs families. The consumption's evolution for these two families of antidiabetic's drugs reflects that the sulfonylureas and metformin are two different pathophysiological target mechanisms underlying the type 2 diabetes. And this increase in the utilization of these families can be explained by the similar scale increase in the number of patients treated. The comparison of the uses of oral antidiabetic show an opposition between Morocco and these European countries that is distinguished by a larger range of new antidiabetics and therefore more expensive, and with a more targeted dissemination of this drugs. The Consumption levels of oral antidiabetic agents in European countries are close to the prevalence of the disease assessed in these countries. In contrast, the United Kingdom consumption is much lower than one observed in France with similar prevalence. In Spain, it is 1.4 times higher than that the one noted in France in 2004, with 2.3 times higher prevalence [12]. However, this analysis is partial because we do not have any information on the habits of diabetes care in each country (monotherapy or combination therapy.).

Consumption analysis of oral antidiabetic agents in the period of this study showed that the increase in the number of DID was high even, in 2005 it was 4.22 DID in over 50% represented by sulfonylureas despite the observed break 2002. This increase reflects better detection and management of diabetes, but these numbers are still relatively small compared to the number recorded in France, which was 39.8 for 2004 against 4.09 for the same year in Morocco. In terms of distribution of antidiabetic's drugs, Morocco has an atypical profile, unlike other European countries. France, Germany and the United Kingdom represented the family of biguanides metformin ranked first in terms of consumption with a number of DID for France that was 20.88, 21.38 for Germany and 20.12 for the United Kingdom [12]. In fact, in Morocco, the consumption of antidiabetic agents increased and this is due to the increase in the prevalence of type 2 diabetes. Metformin during this period occupied the 2nd place after sulfonylureas because of its pharmacological properties,

including the fact that many studies have shown the benefit of this molecule alone or in combination in glycemic control in non-insulin dependent diabetic patients. Its efficiency is comparable to that of insulin and sulfonylureas. It also improves the lipid profile and decreases the incidence of micro-and macrovascular complications. Moreover, since the study of the United Kingdom Prospective Diabetes Study, metformin has become the reference drug in the treatment of obese diabetic [13, 14]. However, in this period there was a high increase in the use of metformin either as monotherapy or with other drugs. This rise was partially due to the increased use of metformin as initial treatment. These findings are consistent with previous reports [15]. However, the percentage of patients who started oral antidiabetic treatment with metformin in 2004 is still low in comparison with other countries [16]. Although the use of antidiabetic's drugs had an increase during the study period, the consumption of other families remained marginal such as alpha-glucosidase inhibitors, Glinides and Glitazones. The management of diabetes is based on appropriate long-term lifestyle measures, including getting enough exercise, correcting major dietary errors, taking prescribed drugs regularly and treating all associated cardiovascular risk factors. Between 1991 and 2005, the consumption of metformin evolved considerably, during this period the increase to use of metformin influenced by the different study as the study of Campbell and UKPDS study [14, 17].

CONCLUSION

In Morocco antidiabetic's consumption has increased between 1991 and 2005, the most frequently antidiabetic prescribed were the sulfonylureas followed by biguanides and glinides, increasing the consumption of the biguanide family in this period was influenced by two major studies UKPDS and Campbell. Despite the increase of these drugs consumption, this level remains very low for the needs of diabetics' patients. The interpretation of the current results findings also highlights the need for other studies epidemiological, prescribing patterns, management protocols, access to care.

CONFLICT OF INTERESTS

Declared none

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