The Cost-Saving of the Introduction of Dapagliflozin in Algeria After Primary Failure of Oral Anti-Diabetics in Patients With Type 2 Diabetes (PwDT2)

EE316

Aburmilah A[1], Hammas Y[2], Nouri N[3], Oulmane N[4], Yala M[4], Yala A[4]
[1]Hikma laboratories, Jordan, Jordan, [2]Hikma laboratories,Algiers,Algeria, [3]Endocrinology & Diabetology Department CHU Constantine,Constantine,Algiers,Algeria,
[4]Access Focus,Algiers,Algeria

INTRODUCTION

Type 2 diabetes mellitus (T2DM), previously considered as a disease of industrialized nations, is now holding high prevalence in Algeria and other emerging countries, ranking fourth among the most common non-communicable diseases in Algeria[1] .

The progressive nature of T2DM requires a range of therapeutic options. As oral antidiabetic treatment loses its effectiveness over time, a therapeutic diversity with multiple mechanisms of action is generally required to achieve and maintain long-term glycemic control.

The initial treatment with Metformin is ineffective or poorly tolerated, hypoglycemic sulfonylurea drugs are commonly used as a second-line treatment.

In the context of diabetes treatment, sodium-glucose cotransporter type 2 (SGLT2) inhibitors have emerged as a significant advance in terms of efficacy and cost-effectiveness.

OBJECTIVES :

The aim of this study is to evaluate the results and financial impact of adding Dapagliflozin propanediol as add-on to Metformin after the primary failure of oral antidiabetic drugs for the treatment of patients with type 2 diabetes (PwDT2) in the Algerian market .

METHODS

This study aimed to assess the clinical outcomes and financial impact associated with the use of Dapagliflozin propanediol as add-on to Metformin for managing PwDT2 who experienced primary failure with Metformin. A comparative analysis was conducted between patients using either Dapagliflozin propanediol or hypoglycemic sulfonylurea drugs in combination with Metformin. The evaluation criteria included the risk of severe hypoglycemia linked to sulfonylurea drugs and the cardiovascular and renal complications of the two treatment approaches.

Drug costs were based on the Algerian public sales price, the costs of severe hypoglycemia, cardiovascular and renal complications were obtained from local Algerian data.

A literature review was carried out to assess the cost of hypoglycemia in Algeria; two studies were published by Pr Zakri, S. (2015)[2] and Sellam 2019[3] which assessed the direct and indirect costs of severe hypoglycemia.

A literature review was performed to assess the prevalence and incidence of hypoglycemia[4] .

The results of the impact of Dapagliflozin propanediol on cardiovascular events in myocardial infarction were obtained from the trial (DECLARE-TIMI 58)[5] which evaluated the effects of Dapagliflozin propanediol on cardiovascular and renal outcomes in PwDT2 with or at risk of atheromatous cardiovascular disease.

RESULTS

Eligible population:

The eligible population for the study of the diabetes market in Algeria is shown in the table below:

Table 1: Eligible population.

Population	%	effect
Total population [6]	100 %	46 553 000
Adult population [6]	57,5%	26 777 286
T2DM population [7]	14,40%	3 855 929
T2DM population on OAD only [8]	61,5%	2 371 396
Population on sulfonylurea drugs [8]	41,8%	1 611 778
T2DM population with cardiovascular risk [9]	6,0%	231 356
T2DM population with renal involvement [10]	0,6%	23 136

Cost of hypoglycemia:

Two studies were performed by Pr Zakri, S. (2015)[2] and Sellam 2019[3] which assessed the direct and indirect costs of severe hypoglycemia and demonstrated that the cost of an episode of severe hypoglycemia was 442,76 USD (60 211 DZD) in 2014. After normalizing the cost to the year 2022 based on World Bank data, the adjusted direct cost of severe hypoglycemic events will be 565 USD (76 877 DZD), and the indirect cost of severe hypoglycemic events will be 131,28 USD (17 854 DZD).

The prevalence of severe hypoglycemia was 5%[4], and the incidence of 0.01 events per person per year. An additional cost of 56 138 531 USD (7 634 278 799 DZD) was estimated taking account the occurence of severe hypoglycemia, and with the estimated 1,611,788 PwDT2 in Algeria, currently using sulfonylureas according to the barometre study published by Pr Belhadj. Table 2 and 3 shows the results:

Table 2: Cost of direct severe hypoglycemic events in patients with type 2 diabetes mellitus treated with a sulfonylurea-based regimen in Algeria.

Direct cost per event USD	Total number of patients	Risk of an event occurring with SU	Total cost DZD	Total cost USD
565	1 611 778	0,05	6 195 427 347	45 557 963
565	1	0,05	3 844	28,3

Table 3: Cost of indirect severe hypoglycemic events in patients with type 2 diabetes mellitus treated with a sulfonylurea-based regimen in Algeria.

Indirect cost per event USD	Total number of patients	Risk of an event occurring with SU	Total cost DZD	Total cost USD
131,28	1 611 778	0,05	1 438 851 452	10 580 568
131,28	1	0,05	893	6,56

Cardiovascular and renal complications in PwDT2 :

Dapagliflozin propanediol has demonstrated favorable cardiovascular effects for PwDT2, including a reduction in the risk of hospitalization for heart failure (HHF), mainly in PwDT2 and established cardiovascular disease, and has also proved to delay the progression of renal disease in PwDT2.

Results showed that Dapagliflozin propanediol reduced myocardial infarction (0.15%), hospitalization for heart failure (HHF) and hemodialysis induction by 0.23%, and 0.33%, respectively. The number of ischemic stroke cases increased slightly (0.01%) (DECLARE-TIMI 58) **(5)**. The costs of all cardiovascular and renal complications were obtained from Hospital Béni Messous and Hospital Birtraria in Algeria.

According to the study ''DISCOVER'', macrovascular disease MVD affects around 6%[9] of all PwDT2 in Algeria, representing 231,356 patients.
According to the results of the Diabcare study, 0.6% of PwDT2 suffer from chronic kidney disease (CKD)[10]. This represents 23,136 patients.

Table.4: Annual savings with Dapagliflozin propanediol for all T2DM patients at cardiovascular.

	Difference in absolute risk (Dapagliflozin vs Placebo)	Cost of the complication USD	Annual cost savings per patient USD	Annual cost savings with Dapagliflozin for all 231,356 T2DM patients at risk of MVD and 23,136 CKD patients USD
Myocardial infarction	0.0015	2 532	3,79	878 555
Ischemic stroke	- 0.0001	1 793	- 0,18	- 41 472
HHF event	0.0023	781,4	1,79	415 786
Start of hemodialysis therapy	0.0033	10 338,45	34,11	789 314
Annual savings with Dapagliflozin propanediol for all T2DM patients (USD)				2 042 182

DISCUSSION AND INTERPRETATION

In the frame work of glycaemic control, a study showed that the combination of Dapagliflozin propanediol withMetformin was non-inferior to the combination of Glimepiride with Metformin[11] . On the other hand, Dapagliflozin propanediol acts by increasing glucose excretion, thereby promoting weight loss, and reducing systolic and diastolic blood pressure[12] . This therapeutic approach could have a positive impact on patients quality of life[13] . It also avoids the significant costs associated with serious hypoglycemic events related to hypoglycemic sulfonylurea drugs, furthermore, it reduces the financial burden related to cardiovascular and renal complications, representing a significant advance in the management of TD2M.

The American Diabetes Association (ADA) generally recommends initial treatment with Metformin, combined with lifestyle measures such as weight management and physical activity. However, it is worth considering the use of Dapagliflozin propanediol in patients who need to minimise the risk of hypoglycemia, and in those who wish to avoid weight gain or promote weight loss.

Dapagliflozin propanediol addresses an unmet medical need by providing equivalent glycemic control without the disadvantages of sulfonylurea drugs, making it a valuable option for the treatment of T2DM.

CONCLUSION

The use of Dapagliflozin propanediol in the treatment of T2DM in Algeria provides glycemic control comparable to sulfonylurea drugs while avoiding hypoglycemic events, cardiovascular and renal complications, as well as weight gain, which are key objectives in the treatment of TD2M. These results could serve as a reference for healthcare decision-makers when considering the inclusion of Dapagliflozin propanediol in treatment strategies for T2DM in Algeria, as well as for decisions related to financial coverage and potential reimbursement, given the clinical and economic benefits demonstrated by this study.

REFERENCES :

1. Lamri et al. Globalization and Health 2014, 10:11. Diabetes in Algeria and challenges for health policy: a literature review of prevalence, cost, management and outcomes of diabetes and its complications
2. Analyse économique et impact budgétaire d'un nouveau système d'autosurveillance glycémique en Algérie
3. ECONOMIC BURDEN OF INSULIN-RELATED HYPOGLYCEMIA IN ADULT PATIENTS TREATED FOR DIABETES MELLITUS IN ALGERIA
4. Prevalence and Incidence of Hypoglycaemia in 532,542 People with Type 2 Diabetes on Oral Therapies and Insulin: A Systematic Review and Meta-Analysis of Population Based Studies
5. Wiviott, S; et al. Dapagliflozin and Cardiovascular Outcomes in Type 2 Diabetes. N Engl J Med 2019; 380:347-357
6. Office national des statistiques 2019
7. ENQUETE STEPWISE ALGERIE 2016-2017 : MEILLEURE CONNAISSANCE DU PROFIL DE SANTE DES ALGERIENS POUR LES FACTEURS DE RISQUE DES MALADIES NON TRANSMISSIBLES
8. BAROMÈTRE Algérie : enquête nationale sur la prise en charge des personnes diabétiques
9. Complications vasculaires chez les patients diabétiques de type 2 : prévalence et facteurs associés dans 38 pays (programme d'étude DISCOVER)
10. DiabCare Algérie 10.1016/S1957-2557(11)70068-2
11. Efficacité et innocuité de la dapagliflozine ou de la dapagliflozine plus saxagliptine par rapport au glimépiride en complément de la metformine chez les patients atteints de diabète de type 2
12. Effects of dapagliflozin, an SGLT2 inhibitor, on HbA(1c), body weight, and hypoglycemia risk in patients with type 2 diabetes inadequately controlled on pioglitazone monotherapy
13. Le rapport coût-efficacité de la dapagliflozine par rapport à la sulfonylurée en complément de la metformine dans le traitement du diabète sucré de type 2

Abbreviations :

T2DM: Type 2 Diabetes Mellitus.
SGLT2: Sodium-glucose cotranporter type 2.
PwDT2: Patients with type 2 diabetes.
MVD: Macrovascular disease.
CKD : Chronic kidney disease.
SU : Sulfonylurea drugs
ADA : American Diabetes Association.
USD: US dollar.
DZD: Algerian dinar.
OAD: Oral Antidiabetic drugs.

Acknowledgements :

The authors thank Benakila Nabil for his contribution to this research study, as well as Lakhlef Oussama for the poster's graphic design.

Contact for further information : - Dr. Yacine Hammas, Hikma laboratories Algeria; YHammas@Hikma.com
- Dr. Newfel Oulmane, Access Focus Algeria; newo@accessfocus-dz.com