American Heart Journal Plus: Cardiology Research and Practice 4 (2021) 100020

Contents lists available at ScienceDirect

American Heart Journal Plus: Cardiology Research and Practice

journal homepage: www.sciencedirect.com/journal/american-heart-journal-plus-cardiology-research-and-practice

Short communication

Global antiplatelet sales trend: A focus on P2Y12 inhibitors from 2008 to 2018

Xuxiao Ye [a], Jessica J.P. Shami [a], Vincent K.C. Yan [a], Wei Kang [a], Joseph E. Blais [a], Jiaxi Zhao [a], Wallis C.Y. Lau [a,b,c], Li Wei [b,c], Ian C.K. Wong [a,b,c,d,e], Esther W. Chan [a,b,d,e,*]

[a] Centre for Safe Medication Practice and Research, Department of Pharmacology and Pharmacy, LKS Faculty of Medicine, University of Hong Kong, Hong Kong Special Administrative Region
[b] Laboratory of Data Discovery for Health, Hong Kong Special Administrative Region
[c] Research Department of Practice and Policy, UCL School of Pharmacy, London, UK
[d] Department of Pharmacy, The University of Hong Kong-Shenzhen Hospital, Shenzhen, China
[e] The University of Hong Kong Shenzhen Institute of Research and Innovation, Shenzhen, China

ARTICLE INFO

Keywords:
P2Y12 inhibitors
Sales trends
Income level
Antiplatelets
Drug utilization

ABSTRACT

Background: P2Y12 inhibitors are an important component of dual antiplatelet therapy. Yet, their accessibility and affordability across countries stratified by income levels have not been studied.
Methods: Sales data were retrieved from the IQVIA Multinational Integrated Data Analysis System for the description of P2Y12 inhibitors global sales. Countries were stratified into 38 high-income countries and 27 middle-income countries.
Results: Global sales of P2Y12 inhibitors increased from 0.80 SU per year per person in 2008 to 1.79 in 2018. Growth in sales of P2Y12 inhibitors was greater in middle-income countries compared to high-income countries. Clopidogrel had the highest sales volume in both high-income and middle-income countries from 2008 to 2018, while ticagrelor sales volume increased mainly in high-income countries.
Conclusions: Despite current guideline recommendations favoring ticagrelor and prasugrel for the prevention of atherothrombotic complications in patients with an acute coronary syndrome, clopidogrel retained the highest sales volume among the P2Y12 inhibitors from 2008 to 2018.

1. Introduction

In combination with aspirin, P2Y12 inhibitors are an important component of dual antiplatelet therapy (DAPT). The 2016/2017 American and European guidelines prefer the use of ticagrelor or prasugrel over clopidogrel in DAPT for the prevention of atherothrombotic complications in patients with an acute coronary syndrome [1,2]. A recent meta-analysis showed that prasugrel and ticagrelor were more effective than clopidogrel against stent thrombosis and cardiovascular death in patients with coronary artery disease [3]. To date, trends in the accessibility and affordability of P2Y12 inhibitors across countries with different income levels have not been described.

2. Methods

A descriptive study using aggregated pharmaceutical sales data from the IQVIA Multinational Integrated Data Analysis System (IQVIA-MIDAS) was conducted using data from 65 countries between 2008 and 2018. The volume of medicines sold to retail and hospital pharmacies was captured from wholesalers in different countries and unified to facilitate global-level analysis. Patient-level data is not available in IQVIA-MIDAS; hence this study was exempted from ethics approval by the Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster. Countries were stratified into 38 high-income countries and 27 middle-income countries according to the World Bank income classification 2018. We obtained population

Abbreviations: CAGR, compound annual growth rate; DAPT, dual antiplatelet therapy; IQVIA-MIDAS, IQVIA Multinational Integrated Data Analysis System; SU, standard unit.

* Corresponding author at: Centre for Safe Medication Practice and Research, Department of Pharmacology and Pharmacy, General Office, L02-56 2/F, Laboratory Block LKS Faculty of Medicine, The University of Hong Kong, 21 Sassoon Road, Pokfulam, Hong Kong Special Administrative Region.
E-mail address: ewchan@hku.hk (E.W. Chan).

https://doi.org/10.1016/j.ahjo.2021.100020
Received 21 April 2021; Accepted 1 June 2021
Available online 16 June 2021

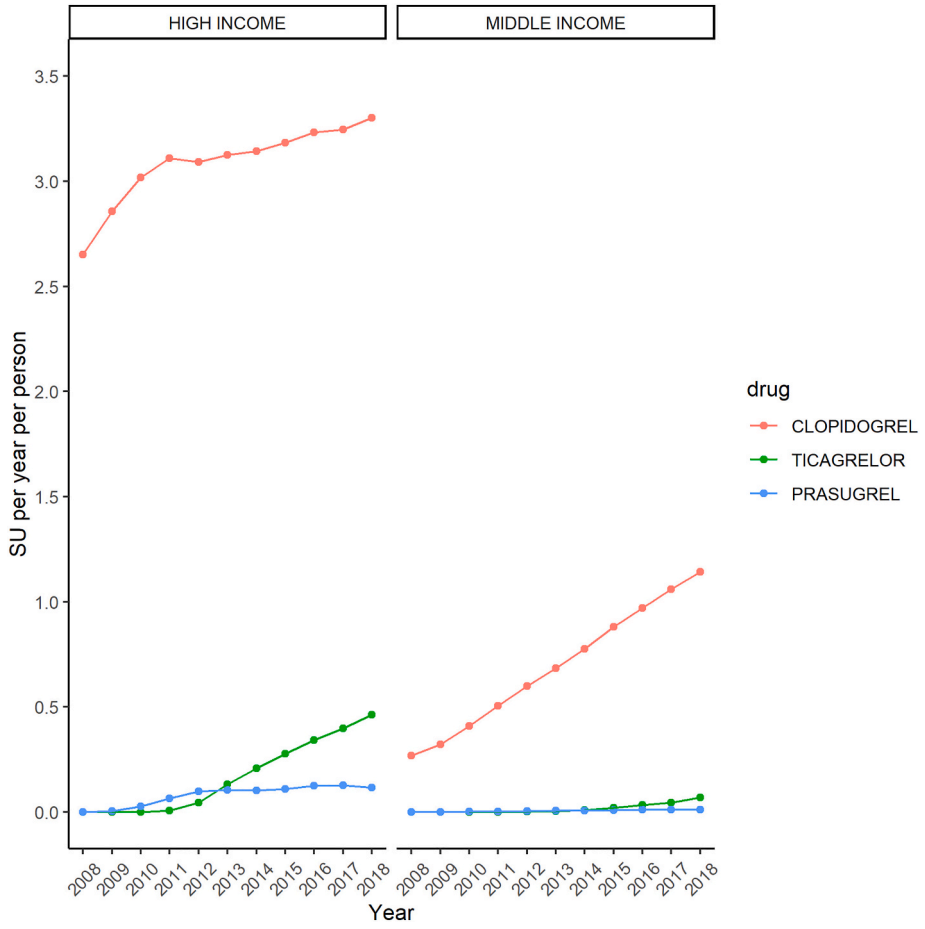

Fig. 1. Global trends in P2Y12 sales stratified by income level from 2008 to 2018.

estimates from the UN World Population Prospects (2019 Report). Clopidogrel, ticagrelor and prasugrel are the oral P2Y12 inhibitors examined in this study.

Sales volume was expressed in standard units (SU) per year per person, and 1 SU was defined as a single tablet, capsule or ampoule/vial or 5 mL oral suspension. The compound annual growth rate ($CAGR = \left(\sqrt{10^{\frac{Annual\ consumption\ (SU)\ in\ 2018}{Annual\ consumption\ (SU)\ in\ 2008}}} - 1\right) \times 100$) was used to quantify changes in sales over time. Data were analyzed using R (version 4.0.2).

3. Results

Overall, global sales of P2Y12 inhibitors increased from 0.80 SU per year per person in 2008 to 1.79 in 2018. Growth in sales of P2Y12 inhibitors was greater in middle-income countries (CAGR 356.93%) compared to high-income countries (CAGR 46.42%). Clopidogrel had the highest sales volume in both high-income and middle-income countries from 2008 to 2018 (Fig. 1). Ticagrelor sales volume increased mainly in high-income countries, while prasugrel remained low on both middle- and high-income countries.

4. Discussion

Ticagrelor demonstrated effectiveness in reducing mortality from vascular causes and myocardial infarction, albeit at a higher price (1.49 USD per standard unit compared with 0.83 of prasugrel and 0.38 of clopidogrel, average price in December 2018 was calculated using IQVIA-MIDAS); hence uptake may have been greater in high-income countries. Prasugrel did not generate high sales volumes regardless of income levels despite effectiveness in reducing the rate of ischemic events although not for overall mortality [4] and a recent meta-analysis indicated that cardiovascular mortality was reduced with prasugrel compared to clopidogrel [3]. Current guidelines advise that prasugrel should not be used in patients with history of stroke or transient ischemic attack. Although ticagrelor and prasugrel are preferred options, the 2016/17 guidelines [1,2] did not appear to influence global sales data. Bleeding risk remains a consideration in clinical management. A recent randomized controlled trial showed clopidogrel was associated with fewer bleeds and consequently is a favorable alternative to ticagrelor or prasugrel for elderly patients [5]. This may explain the high clopidogrel sales volume.

5. Limitations

Patient-level data and information on low-income countries were unavailable for inclusion, where further exploration is needed.

6. Conclusion

Despite current guideline recommendations favoring ticagrelor and prasugrel for the prevention of atherothrombotic complications in patients with an acute coronary syndrome, clopidogrel retained the highest sales volume among the P2Y12 inhibitors from 2008 to 2018.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: ICKW reports personal fees and non-financial support from IQVIA,

outside the submitted work. EWC has received honorarium from the Hospital Authority, research grants from Research Grants Council (RGC, HKSAR), Research Fund Secretariat of the Food and Health Bureau (HMRF, HKSAR), National Natural Science Fund of China, National Health and Medical research Council (NHMRC, Australia), Wellcome Trust, Bayer, Bristol-Myers Squibb, Pfizer, Janssen, Amgen, Takeda, and Narcotics Division of the Security Bureau of HKSAR, outside the submitted work. All other authors declare no competing interests.

Acknowledgements

We thank Lisa Y Lam for proofreading the manuscript.

Funding

This study was supported through funding from the Li Ka Shing Faculty of Medicine, The University of Hong Kong. Mr. Blais is supported by the Hong Kong Research Grants Council as a recipient of the Hong Kong PhD Fellowship Scheme.

References

[1] G.N. Levine, E.R. Bates, J.A. Bittl, et al., 2016 ACC/AHA guideline focused update on duration of dual antiplatelet therapy in patients with coronary artery disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines, J. Thorac. Cardiovasc. Surg. 152 (2016) 1243–1275.

[2] M. Valgimigli, H. Bueno, R.A. Byrne, et al., 2017 ESC focused update on dual antiplatelet therapy in coronary artery disease developed in collaboration with EACTS: the Task Force for dual antiplatelet therapy in coronary artery disease of the European Society of Cardiology (ESC) and of the European Association for Cardio-Thoracic Surgery (EACTS), Eur. Heart J. 39 (2018) 213–260.

[3] Y. Fei, C.K. Lam, B.M.Y. Cheung, Efficacy and safety of newer P2Y(12) inhibitors for acute coronary syndrome: a network meta-analysis, Sci. Rep. 10 (2020), 16794.

[4] S.D. Wiviott, E. Braunwald, McCabe CH, et al., Prasugrel versus clopidogrel in patients with acute coronary syndromes, N. Engl. J. Med. 357 (2007) 2001–2015.

[5] M. Gimbel, K. Qaderdan, L. Willemsen, et al., Clopidogrel versus ticagrelor or prasugrel in patients aged 70 years or older with non-ST-elevation acute coronary syndrome (POPular AGE): the randomised, open-label, non-inferiority trial, Lancet 395 (2020) 1374–1381.