ORIGINAL ARTICLE

Cost Variation with Respect to Drug Price Control Order in Different Brands of Cardiovascular Drugs: An Exploratory Analysis of Brands in India

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Abstract

Introduction: The Drug Price Control Order (DPCO) under the National Pharmaceutical Pricing Authority (NPPA) provides the ceiling prices (CPs) for the National List of Essential Medicines (NLEM) in India. As cardiovascular (CV) drugs are among the major drug categories, we aimed to identify the price differences between the NPPA-CP and marketed brands of CV drugs in the Indian market.

Materials and methods: We performed an exploratory analysis of the pricing of orally administered CV drugs from all categories except antithrombotic drugs from the NLEM and DPCO. The pricing of 13 drug brands was analyzed. The maximum retail price (MRP) of brands was obtained from the online pharmacy portal Tata 1mg (https://www.1mg.com/). The price per tablet or capsule was calculated by dividing the MRP by the number of tablets/capsules in a pack size.

Results: In total, we assessed the pricing of 274 different brands of 13 CV drugs from NLEM. Out of 13 drugs, only 3 (23.1%) had an average price below the NPPA-CP (acetylsalicylic acid, isosorbide dinitrate, digoxin). One drug (metoprolol), across all brands, had a price above the NPPA-CP. Overall, 125 (45.6%) and 149 (54.4%) brands had prices equal/lower and higher than NPPA-CP, respectively. Using metoprolol 25 mg (eight brands) as an example, we determined that the average price was ₹4.09 per tablet more than NPPA-CP. This translated to an additional expenditure of ₹1,488.76 over 1 year and ₹37,219 over 25 years.

Conclusion: Among the available brands of CV drugs, there is wide variation in prices as per NPPA-CP, with more brands having prices above the CP. Pricing differences among brands should be considered by treating physicians when prescribing these drugs.

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Introduction

The cost of pharmaceutical medicines is an important consideration in developing countries like India, where accessibility and affordability are major issues for a large population.[1,2] With a focus on providing access to medicines, especially for common infections and chronic infections that are a threat to public health, the World Health Organization (WHO) developed the Essential Medicines List. In India, the first National List of Essential Medicine (NLEM) was developed in 1996, and the latest revision was done in 2022.[2–4] Such efforts have been repeatedly taken in India owing to a constitutional imperative of the "Right to Life."[5] The right to health is an integral part of this right to life; hence, the government aims at affordability of medicines for the public. In NLEM, a total of 384 drugs are included, with 34 being dropped and 26 new drugs added from the previous list.[6] Furthermore, the National Pharmaceutical Pricing Authority (NPPA) exercised the Drug Price Control Order (DPCO) in 2013 to fix and implement the prices of drugs, and it was last updated in February 2025.[7] The price control policy from NPPA resulted in substantial price reduction in reference drugs.[8] When a drug is patented, it is necessary that the drug must have utility and industrial applicability. With expiry of patent after 20 years, drug falls into the public domain.[9] The rationale of all such mandates is to ensure the affordability of drugs. As India has substantial burden of cardiovascular (CV) diseases, ensuring access and affordability of CV medicines becomes a top priority. In India, there exists a wide difference in prices of different brands.[10,11] Despite the stringent policy directives, it may not be implemented by the stakeholders to the fullest, resulting in brand price differences.[12–15] With this background, our study explored the price differences among different drug brands with respect to NPPA ceiling price (NPPA-CP) of the drugs used for CV ailments.

Materials and Methods

Design and Ethics

This was an observational, exploratory analysis of the cost of different brands listed in NPPA that are used in CV ailments. As the study did not involve human or animal participation, there was no need for ethical permission to conduct this exploratory analysis.

Brand Price Control: Affordability and Availability

Every citizen has a fundamental right to available and affordable medicines. The basic medicines for CV ailments included in the study form part of essentiality for fulfillment of right to health. The cost of such medicines shall be affordable to all as well as sustainable for all for prolonged treatment. The affordability has to be ensured with accessibility for all without discrimination. These objectives are sought to be achieved by DPCO by specifying CP for the medicines.

NPPA Compendium

The compendium of CPs from the NPPA under the Department of Pharmaceuticals, Ministry of Chemicals and Fertilizers, Government of India, was referred to for this study. The revised ceiling pricing was made effective from February 7, 2025. We selected only orally administered drugs for this exploratory analysis. Drugs that were listed as injectables only in the compendium such as adenosine, esmolol, lignocaine, sodium nitroprusside, dobutamine, dopamine, noradrenaline, alteplase, heparin, and streptokinase were excluded. We excluded the injectables as most of these injectables are emergency drugs and may not be administered chronically. The impact of price differences among

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injectables with respect to NPPA-CP may not be disturbing to the patients in comparison to orally administered drugs that are used on long-term basis. Considering these criteria, finally CPs of 13 drug brands were noted from the NPPA compendium.

Brands Pricing

We selected 13 drugs, which included acetylsalicylic acid (ASA), clopidogrel, diltiazem, isosorbide dinitrate, metoprolol, amiodarone, amlodipine, enalapril, ramipril, hydrochlorothiazide (HCTZ), telmisartan, digoxin, and atorvastatin. Pricing for these drug brands with different dose strengths was captured from the online pharmacy Tata 1mg (https://www.1mg.com/). In addition to Tata 1mg, we compared the maximum retail prices (MRPs) across two more online pharmacy stores namely Apollo Pharmacy and PharmEasy. Also, we cross-checked the prices of some commonly used brands for telmisartan, metoprolol, and atorvastatin at a local pharmacy to ascertain the accuracy of MRP of brands included in the analysis. The prices at local store and all three sites had similar pricing of checked brands. Hence, we decided to capture MRP for included drug brands from Tata 1mg pharmacy website. We avoided any discounts offered by the pharmacy and included MRP of each brand. We decided to include at least five brands of each drug to have a comparative analysis of appropriate pricing.

Calculation of Price Per Tablet/ Capsule

Tata 1mg pharmacy website provided MRP and per pack size of the brands. We calculated price per tablet or capsule (PPT/C) by dividing the MRP by pack size. For example, a brand of metoprolol had an MRP of ₹50 for 10 tablets, then PPT was ₹5. Such PPT/C was determined for all 13 drug brands including separate assessment of different dose strengths as available. The pricing was determined for all brands on a single day to avoid changes in MRP, if any. We included the pricing of all drugs as available from Tata 1mg pharmacy website on February 14, 2025. We determined the average PPT/C by combining the pricing of all brands divided by the number of brands. This calculated average price was then compared to NPPA-CP, and the number of brands was then categorized as equal/lower than NPPA-CP and higher than NPPA-CP.

Cost Saving and Expenditure Analysis

Before initiating the price analysis, we decided to perform an economic analysis of any one or two brands that are used as once-a-day treatment to determine the saving or expenditure on cost in a year for the given drug. From the average price derived from brands, we subtracted NPPA-CP. The difference, either lower or higher, was multiplied by 7 (for once-a-day dosing in 1 week) and multiplied by 52 to derive approximate yearly savings and expenditure. This was further assessed, assuming 25 years of drug consumption.

Statistical Analysis

The data were compiled in the Microsoft Excel spreadsheet version 2016 (Microsoft Corp., Redmond, Washington, United States), and the analysis was performed using the same. Descriptive statistics were used to determine the frequency and percentages. Average prices were calculated by dividing the cumulative price of all brands by the number of brands. Range denoted the minimum and maximum price range of the brands.

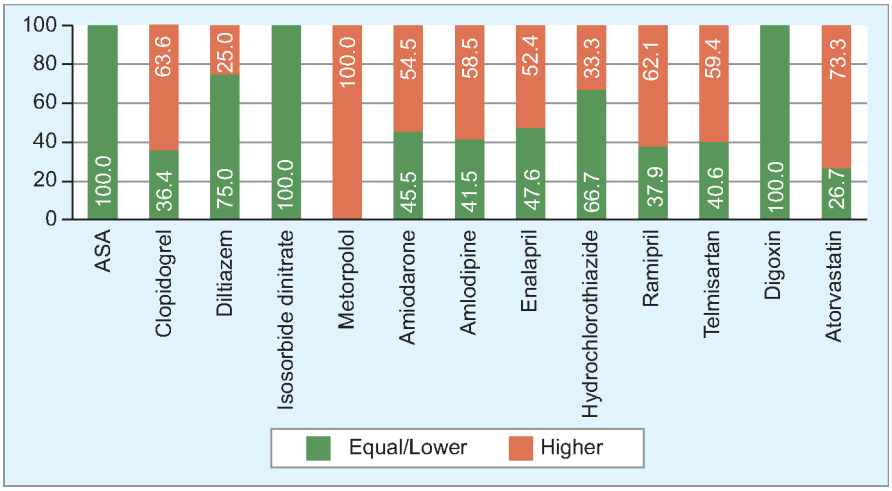

Fig. 1: Brands distribution by drug pricing with respect to CP (ASA, acetylsalicylic acid)

Results

In this study, we assessed the pricing of 274 different brands (with different dosages) of 13 orally administered CV drugs from the NLEM. Figure 1 demonstrates the total number of brands combined by drug strengths with prices with respect to NPPA-CP. Out of 13 drugs, only 3 (23.1%) (ASA, isosorbide dinitrate, and digoxin) had an average price below the recommended CP whereas all brands of one (7.7%) drug (metoprolol) had an average price above the CP. Among the other drugs, majority brands that had prices above NPPA-CP included clopidogrel (63.6%), amlodipine (54.5%), telmisartan (62.1%), and atorvastatin (73.3%). Majority of brands that had lower prices than NPPA-CP included diltiazem (75%) and HCTZ (66.7%). Figure 2 depicts the pricing of different drug brands and their respective NPPA-CP. It provides quick snapshots of the brand pricing. Majority of the drug brands had pricing higher than NPPA-CP. Figure 3 shows the segregated pricing of different brands by dosage strength. Among 274 brands, 125 (45.6%) were equal or lower than the NPPA-CP whereas 149 (54.4%) had price above the CP of NPPA. Maximum 15 brands were assessed for drugs like amlodipine (10 mg), enalapril (2.5 mg), ramipril (5 mg), telmisartan (40 mg), and atorvastatin (10, 20, and 40 mg). When critically looked at drugs like telmisartan, amlodipine, and atorvastatin, majority of brands had a higher pricing than NPPA-CP. For example, with telmisartan, 6, 8 and 5 brands from 20 mg (n = 10), 40 mg (n = 15), and 80 mg (n = 7) strengths were above the NPPA-CP. With amlodipine, 11 brands from 10 mg (n = 15) and 10 brands from 5 mg (n = 12), whereas only 3 brands from 2.5 mg strength (n = 14) had prices above NPPA-CP.

Table 1 shows the pricing comparison of different drug brands included in the study. For 75 mg enteric-coated ASA, average price of five brands (₹0.33) was lower than NPPA-CP (₹0.35). With clopidogrel, the majority (63.6%) of brands had an average price above (₹7.35) the NPPA-CP (₹6.66). For diltiazem 60 and 30 mg tablets, the average price of brands was lower than NPPA-CP. The average price of all six brands of isosorbide dinitrate (₹0.80) was lower than CP (₹0.81). Metoprolol 50 and 25 mg prolonged release brands were priced higher than CP with an average of ₹8.29 and ₹5.97 per tablet. From 12 to 10 brands of amiodarone 100 and 200 mg tablets, six (average: ₹5.88) and four (average: ₹9.87) were below the NPPA-CP (₹6.14 and ₹11.51), respectively. With amlodipine 10 mg and 5 mg, the average price of majority of brands (73.3% with average price ₹7.47 for 10 mg and

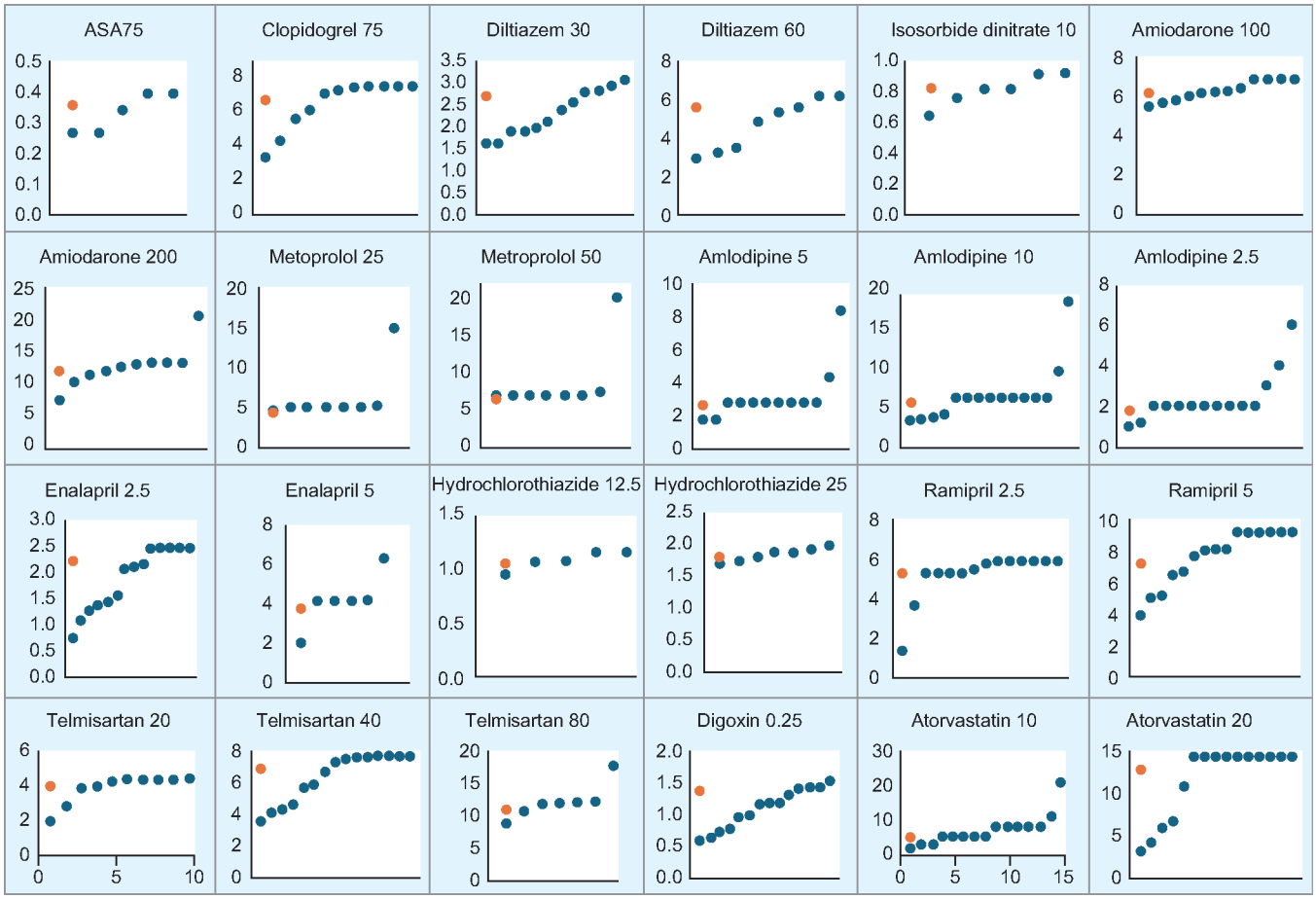

Fig. 2: Price of individual drug brands by dose strength with their CPs. Blue circles indicate price of each brand included in analysis; Single orange circle denotes the NPPA-CP of each brand; All brand strengths are included except for atorvastatin 80 mg brands, to maintain the symmetry of figure. Numbers in front of each drug name indicate the strength of the drug in milligrams (*x*-axis: Number of brands; *y*-axis: MRP in rupees)

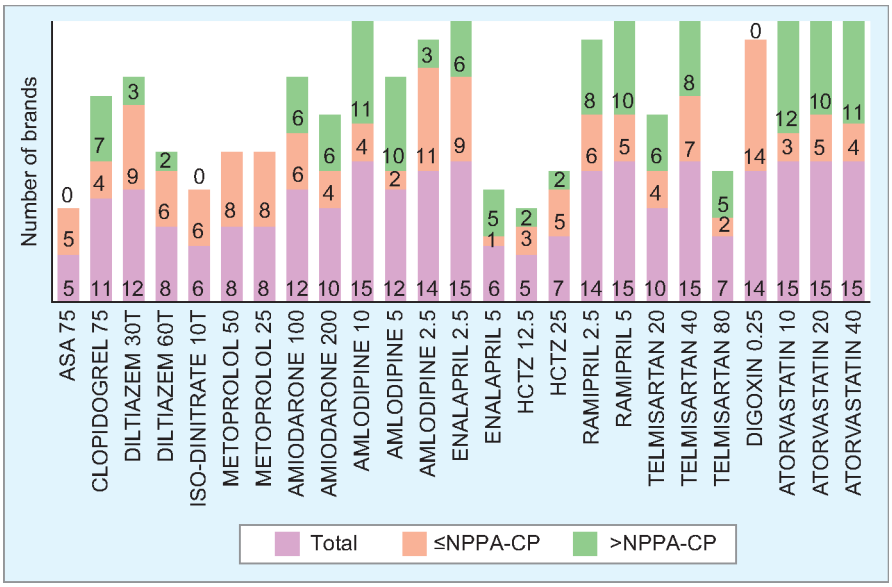

Fig. 3: Distribution of included brands according to the CP segregated by different dose strengths. Digits in front of drug name indicate dose strength; *T* denotes tablet; HCTZ, hydrochlorothiazide

83.3% with average price ₹3.35 for 5 mg) was higher than CP (₹5.45 and ₹2.50, respectively). Contrastingly, 11 out of 14 brands of 2.5 mg amlodipine had price lower than CP (₹2.89). The average price of 60% of enalapril 2.5 mg brands (₹1.49) was lower than NPPA-CP (₹2.19), whereas 83.3% of 5 mg brands were higher (₹4.55) than NPPA-CP (₹3.70). Similarly, variations were seen in the pricing of HCTZ 12.5 mg and 25 mg tablets. Ramipril 5 mg brands had either lower pricing (33.3% with average price ₹5.38) or higher pricing (66.7% with average price ₹8.67) than NPPA-CP (₹7.19). The average price of telmisartan 20 mg, 40 mg and 80 mg strengths was higher (₹4.23, ₹7.45 and ₹12.72, respectively) than NPPA-CP (₹3.88, ₹6.76 and ₹10.40, respectively) for 60%, 53.3% and 71.4% of included brands. All brands of digoxin 0.25 mg tablets had prices lower than NPPA-CP. With atorvastatin, the majority brands from 10 mg, 20 mg, and 40 mg tablet strengths had higher pricing, with averages of ₹8.39, ₹14.07, and ₹21.53, respectively, than the recommended NPPA-CP (₹4.94, ₹12.56, and ₹19.30, respectively).

Cost Saving and Expenditure

In this analysis, we included metoprolol 25 mg and atorvastatin 10 mg as examples to assess savings and expenditure in a year. For metoprolol 25 mg tablet, NPPA-CP is ₹4.20, which is subtracted from the average price of ₹8.29 of 8 brands. Thus, ₹4.09 per tablet is in excess of the NPPA-CP. Considering a once-a-day dose, 7-day excess expenditure with it is

Table 1: Price comparison of different CV drugs with CP from NPPA

Drug	*Dose (mg)*	*Dosage form*	*NPPA PPT/C (₹)*	*Brands assessed (n)*	*Lower/equal to DPCO price [n (%)]*	*Average lower PPT/C (range) (₹)*	*Higher than DPCO price [n (%)]*	*Average higher PPT/C (range) (₹)*
ASA	75	Tablet (EC)	0.35	5	5 (100.0)	0.33 (0.26–0.39)	–	–
Clopidogrel	75	Tablet	6.66	11	4 (36.4)	4.78 (3.29–6.07)	7 (63.6)	7.35 (7.04–7.46)
Diltiazem	30	Tablet	2.68	12	9 (75.0)	2.06 (1.06–2.75)	3 (25.0)	2.90 (2.80–3.01)
	60	Tablet	5.46	8	6 (75.0)	4.15 (2.84–5.48)	2 (25.0)	6.11 (6.10–6.11)
Isosorbide dinitrate	10	Tablet	0.81	6	6 (100.0)	0.80 (0.63–0.91)	–	–
Metoprolol	50	Tablet (PR)	5.84	8	–	–	8 (100.0)	8.29 (6.53–20.0)
	25	Tablet (PR)	4.20	8	–	–	8 (100.0)	5.97 (4.31–14.78)
Amiodarone	100	Tablet	6.14	12	6 (50.0)	5.88 (5.50–6.19)	6 (50.0)	6.69 (6.26–6.88)
	200	Tablet	11.51	10	4 (40.0)	9.87 (7.07–11.51)	6 (60.0)	13.95 (12.41–20.00)
Amlodipine	10	Tablet	5.45	15	4 (26.7)	3.52 (3.27–3.80)	11 (73.3)	7.47 (6.06–18.12)
	5	Tablet	2.50	12	2 (16.7)	1.66 (1.66–1.66)	10 (83.3)	3.35 (2.80–8.40)
	2.5	Tablet	1.79	14	11 (78.6)	1.84 (1.05–2.0)	3 (21.4)	4.34 (3.01–6.00)
Enalapril	2.5	Tablet	2.19	15	9 (60.0)	1.49 (0.7–2.10)	6 (40.0)	2.44 (2.41–2.45)
	5	Tablet	3.70	6	1 (16.7)	1.87	5 (83.3)	4.55 (4.13–6.22)
Hydrochlorothiazide	12.5	Tablet	1.04	5	3 (60.0)	1.03 (0.94–1.08)	2 (40.0)	1.66 (1.16–1.16)
	25	Tablet	1.75	7	5 (71.4)	1.77 (1.68–1.85)	2 (28.6)	1.92 (1.89–1.95)
Ramipril	2.5	Tablet	5.21	14	6 (42.8)	4.27 (1.22–5.22)	8 (57.2)	5.76 (5.39–5.84)
	5	Tablet	7.19	15	5 (33.3)	5.38 (3.79–6.66)	10 (66.7)	8.67 (7.64–9.16)
Telmisartan	20	Tablet	3.88	10	4 (40.0)	3.04 (1.90–3.87)	6 (60.0)	4.23 (4.13–4.33)
	40	Tablet	6.76	15	7 (46.7)	4.88 (3.50–6.61)	8 (53.3)	7.45 (7.20–7.57)
	80	Tablet	10.40	7	2 (28.6)	9.3 (8.4–10.2)	5 (71.4)	12.72 (11.40–17.40)
Digoxin	0.25	Tablet	1.33	14	14 (100.0)	1.06 (0.57–1.49)	–	–
Atorvastatin	10	Tablet	4.94	15	3 (20.0)	2.71 (1.95–3.10)	12 (80.0)	8.39 (5.53–20.4)
	20	Tablet	12.56	15	5 (33.3)	5.95 (2.98–10.57)	10 (66.7)	14.07 (14.07–14.07)
	40	Tablet	19.30	15	4 (26.7)	13.66 (8.71–17.61)	11 (73.3)	21.53 (21.16–21.62)

PR, prolonged release

₹28.63 which will be translated to ₹1,488.76 for 52-weeks (approximately 1 year). If a person consumes it for 25 years, the total expenditure will be nearly ₹37,219. With atorvastatin 10 mg, NPPA-CP is ₹4.94. Three brands had a lower price with an average of ₹2.71. The average per tablet saving is ₹2.23. With once-a-day dosing, 7-day saving will be ₹15.61 and that is translated to saving of approximately ₹811.72. Over a 25-year period, total savings could be ₹20,293.

Discussion

This exploratory analysis finds that there is variation in the pricing of different brands available in the Indian market with respect to prices recommended by DPCO. Multiple studies conducted in similar fashion have reflected varying prices among brands. A study from Bengaluru, India, by Aditya et al. observed variation in prices among the antihypertensives. They found that the majority of telmisartan brands listed in Current Index of Medical Specialties (CIMS) for 20 mg (78.12%), 40 mg (66.66%), and 80 mg (76.19%) were above the NPPA-CP. This trend was persistent when they compared the pricing at local pharmacy. Other drugs such as amlodipine 5 mg (40.81% brands) and HCTZ 25 mg (50% brands) were above the NPPA-CP.[16] Ray et al. from Bhopal, India observed wide variation in the prices of anticoagulants, fibrinolytics, and antiplatelet agents. Between the lowest and highest price of brands, highest variation of 1408.44% was reported for prasugrel followed by heparin (668.67%), clopidogrel (444.35%), and aspirin (333.33%).[14] However, in our analysis, all brands of ASA were below the NPPA-CP but for clopidogrel, majority were above the CP. Similar reports of high price variation among the brands for CV drugs and antibiotics,[17] antidiabetic drugs,[18] and antipsychotics[19] have been published from India. It is worth pointing out that the death rate due to cardiovascular disease (CVD) was 2.26 million in 1990, which has increased to 4.77 million in 2020.[20] A 2016 study by Prabhakaran et al. reported that nearly one out of four deaths from total deaths were due to CV diseases in India.[21] We observed that out of 13 drugs studied, only 3 drug brands were below the CP, and all the brands of one drug (metoprolol) were above the CP. On top of it, 54.4% of total brands studied were higher than CP. This discrepancy in the pricing of different brands can lead to an enormous burden on patients who may not be able to afford the common medications. With such high CV disease burden, higher costing of majority of the CV drugs arises the question of fulfillment of right to life and health of the common man. The issue of higher costs associated with NLEM drugs is not observed only in India. Studies from Malaysia and Belgium also reported similar findings.[22,23]

The repercussions of variations in prices can be huge. We further analyzed the expected expenditure with an example of metoprolol. There was an additional ₹1,500 loss per month as brands did not follow the CP limit. We must understand this was based on the average price of all the drug brands studied. Over the 25 years, this expenditure may be to the tune of nearly ₹37,000. Considering the CV ailments that generally require multiple drug therapy, there could be substantial expenditure on all the medications that go beyond the CPs. In a highly populated country like India with higher rate of CVD patients, substantial price discrepancy might lead to unaffordability. WHO finds that in the Southeast Asia region, despite improving the availability of essential medications in the region, there remains the challenge of accessibility because of high out-of-pocket (OOP) expenditure. This has

resulted in poverty stricken on 65 million people every year.[24] This finding highlights the urgent need to strongly implement the NPPA across the country. Interestingly, we have discussed this about the drugs under the DPCO. For the drugs that are not under the price control, the changes in prices are more significant that further impact the OOP expenditure and thereby the access to essential medicines.[25] Studies have identified variations in prices of various hypolipidemic drugs in the Indian market.[26] The findings have implications for policy implementation. Besides control of the price, accessibility to drugs is also important. In 2008 Government of India launched Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP) to ensure availability of quality generic medicines that are available at affordable prices.[27] Recent study from Tamil Nadu highlighted that CV drugs are the commonly available drugs at Janaushadhi centers and overall, the cost was lower by nearly 65% compared to branded drugs.[28] Combined with DPCO, PMBJP offers to further improve the affordability of essential drugs to all. However, the experts believe that it is important to improve the implementation of policies, improve the supply chain, enhancing physicians' engagements and increasing public awareness of these schemes is still essential to enhance the adoptability across the country.[29]

Our study has certain limitations. We assessed only a limited number of drugs and their brands. Assessing a greater number of drugs and inclusion of higher number brands may provide the complete picture for the CV drugs. We did not compare the pricing of the drugs that are not under the DPCO to the counterpart drugs under DPCO. It is also important to understand that the DPCO list is updated frequently and thus the changes in brand pricing may not be reflected in real time. Analyzing prescription-based pricing can provide real-time insights related to expenditure on medications. Also, we did not assess the generic or Jan Aushadhi brands that could have potential differences in pricing compared to branded medications as the inclination of patients is more toward branded medicines. It is not clear whether there are any pricing differences at Tata 1mg pharmacy for rural or urban setting, and thus the findings of the study may have limitations.

Conclusion

This exploratory analysis of various CV drugs identifies variations in prices of different brands, majority being above the CP indicated by DPCO. This may result in excess expenditure on essential medicines. Changes to the NPPA policy are needed to expand the list of drugs under the DPCO to make medicines more affordable. Physicians should consider the pricing of the drug brands as long-term treatment may result in excessive economic burden on the individuals suffering from CV ailments.

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