

ORIGINAL RESEARCH ARTICLE

STUDY ON COST VARIATION OF ORAL ANTIHYPERTENSIVE MEDICATIONS AVAILABLE IN RETAIL STORES ACROSS CHITWAN

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ABSTRACT

Background: Antihypertensive medications reduce blood pressure and decrease cardiovascular disease morbidity and mortality. A number of antihypertensives with same formulation but different prices are available in the market. In the present study we aim to study such price variations of antihypertensive drugs currently available in the Nepalese market.

Methods: We obtained the marked price of different antihypertensives manufactured in Nepal and India from various medicine stores within Chitwan from February to June 2021. Cost ratio (CR) and percentage cost variation (%CV) was calculated using Microsoft Office Excel-2019.

Results: We observed a high percentage of cost variation in Amlodipine 5mg (CR: 3.33 %CV: 233.33) among Nepali and Losartan 50mg (CR: 32.31 %CV: 3131.47) among Indian antihypertensives.

Conclusions: A wide percentage cost variation was observed among antihypertensive medications currently available in the Nepalese market. Regulatory bodies could address the issue to ensure affordability of essential antihypertensive medications.

INTRODUCTION

Elevated blood pressure is the major cause of stroke and coronary artery diseases accounting for more than half of cardiovascular related morbidity and mortality worldwide.¹ The prevalence of hypertension in Nepal is estimated at around 28.3%.²

The price of antihypertensive drugs available in the market vary widely between classes and brands. Medication being the biggest share of hypertension treatment expense could be a significant factor for non-adherence. Treating physician's choice of drug depends on various factors like age, co-morbid conditions, availability and cost of the drug. Low-cost drugs have been found to decrease financial burden and improve adherence.³ The results obtained from this study could prove beneficial to the prescribing physicians in choosing cost-effective antihypertensive therapy.

In the present study, we aim to investigate the price of Nepalese and Indian antihypertensive drugs available in the market and report the findings as of June 2021.

METHODS

This descriptive, cross-sectional study was conducted at various medicine stores operating within Bharatpur-Chitwan from February 2021 to June 2021. A list of antihypertensive drugs approved for use in the country was obtained from DDA (Department of Drug Administration)-Nepal⁴ website. We obtained minimum and maximum price of available oral antihypertensives drugs (price of 10 tablets/capsule) in the same dosage form and strength manufactured by different pharmaceuticals companies in Nepal and India. The price was obtained from different local retail stores, hospital pharmacies and wholesale importers based within Chitwan.

Cost ratio between the maximum and minimum price of the same drug manufactured by different companies was calculated as:

$$\text{Cost ratio} = \frac{\text{Maximum Cost}}{\text{Minimum cost}}$$

Table 1: Cost ratio and percentage cost variation of antihypertensive drugs manufactured in Nepal

Drug	Dosage	Minimum Cost	Maximum Cost	Cost Ratio	% Cost variation
Calcium Channel Blocker					
Amlodipine	10mg	6.0	8.0	1.33	33.33
	5mg	3.0	10.0	3.33	233.33
	2.5mg	2.0	6.5	3.25	225
Beta Blockers					
Atenolol	100mg	2.0	3.81	1.90	90.5
	50mg	3.0	4.0	1.33	33.33
	25mg	2.0	3.99	1.99	99.5
Propranolol	40mg	4	4.3	1.07	7.5
	20mg	3	4.9	1.63	63.33
	10mg	2	3.5	1.75	75
Metoprolol	50mg	5.3	10.5	1.98	98.11
	25mg	3.2	7	2.18	118.75
	12.5mg	2.2	6.75	3.06	206.81
Angiotensin Converting Enzyme Inhibitors (ACEI)					
Ramipril	5mg	8.16	16.0	1.96	96.07
	10mg	5.0	7.0	1.4	40
Enalapril	5mg	4.0	4.29	1.07	7.25
	2.5mg	2.3	2.46	1.06	6.95
Angiotensin Receptor Blockers (ARB)					
Losartan	50mg	7.5	11.4	1.52	52
	25mg	4	7.08	1.77	77
Miscellaneous					
Hydrochlorothiazide	25mg	3.2	4.1	1.77	28.12
	12.5mg	1.75	2.0	1.14	14.28
Spironolactone	100mg	10.8	11	1.01	1.85
	50mg	6.3	7	1.11	11.11
	25mg	2.72	3.5	1.28	28.67

Percentage of cost variation was calculated as:

$$\% \text{ Cost Variation} = \frac{(\text{Maximum Cost} - \text{Minimum Cost})}{\text{Minimum Cost}} \times 100$$

We included the price of oral antihypertensive drugs only and combination drugs were excluded from the study. A unique drug formulation or dosage manufactured by only one company was excluded from the analysis. Ethical clearance was obtained from Chitwan Medical College-Institutional Review Committee (Ref: CMC-IRC/077/078-270) Data was entered and analyzed using Microsoft Office-Excel 2019.

RESULTS

A combined 109 pharmaceutical companies are registered with DDA, Nepal.⁴ We analyzed the price of 9 different antihypertensives produced by 23 different pharmaceutical companies in Nepal. Among the analyzed antihypertensives manufactured within Nepal, maximum cost variation was observed with calcium channel blocker group of drugs (Amlodipine 5mg CR: 3.33, %CV: 233.33) and the least variation with Spironolactone (100mg CR:1.01, %CV: 1.81) (Table 1).

Likewise, we analyzed 12 antihypertensives manufactured in India. Among these antihypertensives, largest CR and

%CV was observed with ARB group pf drugs (Losartan 50mg CR: 32.31, %CV: 3131.47) and the lowest among Calcium channel blocker (Verapamil 80mg CR:1.06, %CV:6.5) (Table 2).

DISCUSSION

Cardiovascular disease (CVD) is the leading cause of mortality worldwide and elevated blood pressure remains the greatest risk factor of CVD's.⁵ Antihypertensive medications are cornerstone to long term blood pressure control; thus, helping prevent secondary complications. Higher cost medicines may be unaffordable to a majority of Nepali population. This could contribute to progression of disease and mortality.⁵ Out of pocket payment for medicine is the top family expenditure among people residing in low and middle economic countries which may account as high as 60% of the total family income.⁶ Past studies show Calcium Channel blockers to be the most prescribed antihypertensives in Nepal.⁷ We observed a maximum CV among same group of drugs. Such discrepancies in price of widely used drug could negatively contribute to existing financial burden among hypertensive patients. ARB's remain the second choice of antihypertensive medication in Nepal.⁷ The highest CV (32.31) was observed among ARB's manufactured in India. Such inconsistencies in prices of widely used therapeutic drugs warrants regular monitoring by the concerned authorities.

Table 2: Cost ratio and percentage cost variation of antihypertensive drugs manufactured in India

Drug	Dosage	Minimum Cost	Maximum Cost	Cost Ratio	% Cost variation
Calcium Channel Blocker					
Amlodipine	10mg	8.0	11.8	1.47	47.5
	5mg	2.4	15.16	15.16	544.16
	2.5mg	1.5	8.86	5.90	490.66
Nifedipine	20mg	4.04	5.09	1.25	25.99
	10mg	1.4	3.07	2.19	119.28
Verapamil	80mg	2.0	2.13	1.06	6.5
	40mg	1.17	1.25	1.06	6.83
Diltiazem	60mg	8.48	10.62	1.25	25.23
	30mg	4.04	6.08	1.50	50.49
Beta Blockers					
Atenolol	100mg	5.76	7.23	1.25	25.52
	50mg	1.78	4.55	2.55	155.61
	25mg	2.9	3.13	1.07	7.93
Propranolol	40mg	4.0	7.24	1.81	81
	20mg	3.0	5.62	1.87	87.33
	10mg	1.8	2.9	1.61	61.11
Metoprolol	50mg	4.58	19.01	4.15	315.06
	25mg	2.62	14.06	5.36	436.64
	12.5mg	2.2	9.45	4.29	329.54
Angiotensin Converting Enzyme Inhibitors (ACEI)					
Ramipril	10mg	22.75	28.68	1.26	26.08
	5mg	2.55	18.24	7.15	615.29
Enalapril	5mg	4.6	5.03	1.09	9.34
	2.5mg	2.8	3.62	1.29	29.28
Angiotensin Receptor Blockers (ARB)					
Losartan	50mg	4.48	144.77	32.31	3131.47
	25mg	2.72	71.04	26.11	2511.76
Miscellaneous					
Hydrochlorothiazide	25mg	2.83	3.46	1.22	22.26
	12.5mg	1.4	2.18	1.55	55.71
Spironolactone	100mg	12.26	27.92	2.27	127.73
	25mg	3.2	4.37	1.55	36.56

The pricing of drugs in Nepal is regulated by DDA. The price depends on the cost of active pharmaceutical ingredient (API), and manufacturing costs. Also, marketing and promotional strategies of companies influence the price.⁸ These could be important factors determining drug pricing. Likewise, transportation and promotion costs determine drug pricing of Indian products. Besides, all pharmaceutical companies producing antihypertensive drugs in Nepal are private owned and the tendency of private companies to generate profit could further impact drug pricing.

We observed a low-cost variation among Nepali to Indian antihypertensive drugs. All API are imported to Nepal and the strategic location of pharmaceutical companies producing such drugs does not sway away the price much. Also, the weaker and meager marketing policy of Nepali companies help check and balance rival companies.

Prescribing a particular drug is entirely physician-dependent. It has been shown that physician prescribe drugs based on

pharmaceutical companies marketing and promotion strategies as well as personal benefits.⁹ The likelihood of prescribing drugs based on personal interest increases with professional stature and practice. Specialty services being highly centralized and private practice could further escalate such behavior. It has become a need to educate physicians regarding the cost of drugs and encourage use of valid and reliable guidelines to tackle the situation.

The change in price of drugs is an ongoing phenomenon. The price presented here may subject to change each year. Nonetheless, concerned authorities including DDA need to constantly monitor such variations.

CONCLUSION

We have highlighted the wide cost-variation among different antihypertensive medications available in the market. The concerned authority should imply active measures to maintain the quality and uniformity in price of essential drugs and ensure

easy availability and affordability. Prescribing physicians should as well take into account the financial status of the patient and pricing of commonly used antihypertensives before prescribing. Rational prescription of low-cost drugs could help improve drug adherence and improve mortality.

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