Cost analysis of oral antihypertensive drugs available in the retail pharmacies in Bhairahawa, Nepal

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ABSTRACT

Introduction: Hypertension is highly prevalent in Nepal, but its treatment and control are poor due to high drug costs and weak regulation. Most patients have to pay on their own, hence the variations in prices of antihypertensive drugs increase financial burden, limiting effective management. The purpose of this study was to analyze the variation in price of different brands of same oral antihypertensive agent available in the retail pharmacies located in Bhairahawa and to compare the cost of antihypertensive agents manufactured by Nepalese and Indian pharmaceutical industries.

Methods: A cross-sectional descriptive study was conducted at the randomly selected 42 registered retail pharmacies located in Bhairahawa Nepal over one year period for cost analysis of oral antihypertensive agents.

Results: Cost variation was observed in 14 different formulations of oral antihypertensive agents (87.5%) out of 16 different formulations analyzed. The maximum cost variation (CV) among individual preparations was observed with S (-) Amlodipine 5mg tablet (%CV: 116.43%) whereas among combination preparations, maximum price variation was observed with Furosemide 20mg + Spironolactone 50mg tablet (%CV: 138.13%). The Result of Two-Sample t-test showed no significant mean difference between price of Nepalese and Indian brands of antihypertensive drugs.

Conclusion: There is significant variation in the price of oral antihypertensive agents available in the retail pharmacies in Bhairahawa. Such price variation can act as a barrier in the treatment and control of hypertension especially when physicians prescribe a more expensive brand. Thus, it is highly necessary for government and other concerned authorities to develop and implement better pricing strategies.

Keywords: cost analysis, hypertension, percentage cost variation.

INTRODUCTION

Hypertension, defined as systolic blood pressure of 140 mmHg or more and diastolic pressure of 90 mmHg or more, is one of the leading contributors to cardiovascular disease, stroke, and premature death, accounting for over 13% of global mortality.[1] Effective management with drugs such as ACE inhibitors, Angiotensin II Receptor Blockers (ARBs), calcium channel blockers, diuretics, and β- or α-blockers has been shown to reduce complications and deaths.[2]

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In Nepal, although hypertension is highly prevalent, their is limited awareness, hence there is inadequate treatment and control.[3] Limited financial resources, high drug prices, and poor availability of medicines affect adherence medicine.[4] Since health insurance coverage is minimal, most patients depend on out-of-pocket spending, causing access to medicine, a major concern.[5] The Department of Drug Administration regulates prices of only a small number of medicines, leaving considerable variation in the cost of the same drug across different brands.[6,7]

Despite growth in local pharmaceutical industries, Nepal relies heavily on imports, mainly from India.[8] Studies have reported wide differences in

prices of drugs for hypertension and other chronic conditions depending on the manufacturer.[7] However, information on cost variation of antihypertensive medicines produced in Nepal is scarce. Therefore, this study was undertaken to analyze the price variation of different brands of oral anti hypertensives available in pharmacies in Bhairahawa, Nepal.

METHODS

This was cross sectional descriptive study which was conducted over a period from October, 2023 to September, 2024 at all 42, registered retail pharmacies located in Bhairahawa after obtaining ethical clearance from the Institutional review committee [UCMS/IRC/058/23]. Purposive sampling technique was used.

The cost of particular Department of Drug Administration (DDA) registered antihypertensive drugs of same dose and dosage form manufactured by different pharmaceutical company were obtained by directly reviewing the maximum retail price printed on the drug strips or containers available at the retail pharmacies at the time of data collection. Informed consent was obtained from the retail pharmacy personnel before collecting drug price data. Oral antihypertensive drugs of single brand available were excluded from the study. Data obtained were classified, tabulated and rechecked to ensure quality and were entered and analyzed. Descriptive statistical analysis and inferential statistical analysis [i.e two sample t-test] were carried out.

Cost ratio and percentage of cost variation were calculated as follows:
The cost ratio was calculated by dividing the maximum cost by the minimum cost, and the percentage cost variation was calculated by subtracting the minimum cost from the maximum cost, dividing the result by the minimum cost, and multiplying by 100.

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

$$\text{Percentage cost variation (\%CV)} = \frac{\text{Maximum cost} - \text{Minimum cost}}{\text{Minimum cost}} \times 100$$

RESULTS

The study analyzed 10 oral antihypertensive medicines (16 formulations). Majority (87.5%) showed price variation, ranging from 6.06% to 138.13%. The highest variation was seen with Furosemide 20mg + Spironolactone 50mg (138.13%) and S(-) Amlodipine 5mg (116.43%). For drugs manufactured in Nepal, 62.5% of formulations varied, from 8.33% to 98.11%, with maximum variation in Metoprolol 50mg (98.11%) and Furosemide 20mg + Spironolactone 50mg (50%). For Indian products, 87.5% varied, from 6.06% to 91.85%, with maximum variation in Telmisartan 20mg (26.58%) and Amlodipine 5mg + Telmisartan 40mg (91.85%) as shown in Table 1.

Mean price of 16 different formulations of 10 oral antihypertensive drugs was calculated for both Nepalese and Indian brands as shown in Figure 1. There was no significant mean difference between price of Nepalese and Indian brands of oral antihypertensive medicines [P-value: 0.18].

DISCUSSION

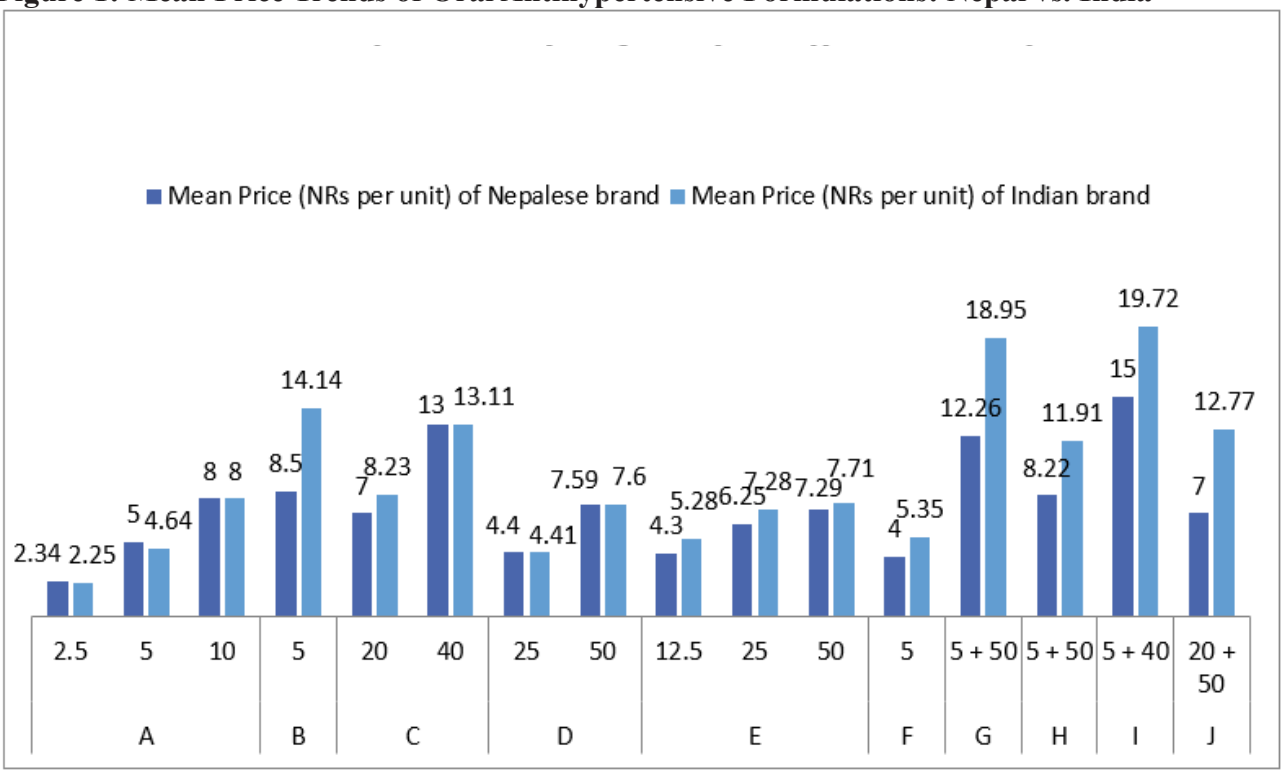
In our study, highest cost variation among individual drug preparation was observed with Calcium Channel Blockers class of drugs, with S (-) Amlodipine 5mg (%CV: 116.43%) whereas among combination preparations, maximum price variation was observed with Furosemide 20mg + Spironolactone 50mg (%CV: 138.13%). Such differences in the prices of most commonly prescribed drugs may cause financial burden to the patients, particularly when they are unknown about the differences in prices of same drug molecule manufactured by different pharmaceutical industries and when they are prescribed a certain brand of drug that is more expensive than the other.

Few studies was carried out in Nepal analyzing cost variation of different brands of oral antihypertensive available in the selected retail pharmacies in Nepal. This study shows significant variation in price (up to 138.13%) of different brands of oral antihypertensive drugs available in Nepal. The results of our study showed price variation of oral antihypertensive agents ranging from 0.23% to 138.13% which is higher than the

Table 1: Cost analysis of oral antihypertensive agents available in the retail pharmacies across Bhairahawa

Generic name of drug	Strength (mg)	Minimum cost (NRs)			Maximum cost (NRs)			Cost Ratio			% Price Variation		
		Nepalese	Indian	Overall	Nepalese	Indian	Overall	Nepalese	Indian	Overall	Nepalese	Indian	Overall
Amlodipine	2.5	2.30	2.20	2.20	2.50	2.30	2.50	1.09	1.05	2.50	8.70	4.55	13.64
	5	5.00	4.25	4.25	5.00	5.00	5.00	1	1.18	5.00	0.00	17.65	17.65
	10	8.00	8.00	8.00	8.00	8.00	8.00	1	1.00	8.00	0.00	0.00	0.00
S (-) Amlodipine	5	7.00	13.12	7.00	10.00	15.15	15.15	1.43	1.15	15.15	42.86	15.47	116.43
Telmisartan	20	7.00	7.26	7.00	7.00	9.19	9.19	1.00	1.27	9.19	0.00	26.58	31.29
	40	13.00	13.10	13.00	13.00	13.12	13.12	1.00	1.00	13.12	0.00	0.15	0.92
Losartan	25	4.40	4.40	4.40	4.41	4.41	4.41	1.00	1.00	4.41	0.23	0.23	0.23
	50	7.60	7.60	7.60	7.60	7.60	7.60	1.00	1.00	7.60	0.00	0.00	0.00
Metoprolol	12.5	2.90	5.04	2.90	5.00	5.52	5.52	1.72	1.10	5.52	72.41	9.52	90.34
	25	4.00	6.78	4.00	7.00	8.00	8.00	1.75	1.18	8.00	75.00	17.99	100.00
	50	5.30	5.30	5.30	10.50	5.49	10.50	1.98	1.04	10.50	98.11	3.98	98.11
Enalapril	5	4.00	5.28	4.00	4.00	5.49	5.49	1.00	1.04	5.49	0.00	3.98	37.25
Amlodipine 5mg + Losartan 50mg	5 + 50	11.00	13.60	11.00	13.00	24.00	24.00	1.18	1.76	2.18	18.18	76.47	118.18
Amlodipine 5mg + Atenolol 50mg	5 + 50	7.00	11.52	7.00	9.00	12.43	12.43	1.29	1.08	1.78	28.57	7.90	77.57
Amlodipine 5mg + Telmisartan 40mg	5 + 40	14.00	13.01	13.01	16.00	24.96	24.96	1.14	1.92	1.91	14.29	91.85	91.85
Furosemide 20mg + Spironolactone 50mg	20 + 50	6.00	11.25	6.00	9.00	14.29	14.29	1.50	1.27	2.38	50.00	27.00	138.13

Figure 1: Mean Price Trends of Oral Antihypertensive Formulations: Nepal vs. India



[A: Amlodipine B: S(-) Amlodipine C: Telmisartan D: Losartan E: Metoprolol F: Enalapril G: Amlodipine+ Losartan H: Amlodipine+ Atenolol I: Amlodipine+ Telmisartan J: Furosemide+ Spironolactone]

results of the study conducted in a pharmacy of Chitwan Medical College Teaching Hospital which showed price variation of medicines used for the long term management of non-communicable diseases, which includes Hypertension, to be in the range of 0.48% to 60%.[9] This difference may be due to involvement of single tertiary care center in that study as well as due to inclusion of only those drugs that are manufactured by Nepalese pharmaceutical companies. Such variation in prices of same drug manufactured by different pharmaceutical industries may affect affordability by patients.[10] A similar study conducted in eastern Nepal observed highest price variation between maximum and minimum priced brands of oral antihypertensives with Amlodipine 5 mg tab (806.49%) followed by Telmisartan 20 mg tab (73.76%) which is significantly higher than price variation observed with our study.[11] Such variation in the prices of drugs are common in developing countries like Nepal where the regulation of pharmaceutical sector is still poor.[12]

In a similar study conducted in retail stores across Chitwan, price variations of different oral antihypertensives manufactured in Nepal and India were analyzed. Among the antihypertensives manufactured within Nepal, maximum cost variation was observed with calcium channel blocker group of drugs (Amlodipine 5mg CR: 3.33, %CV: 233.33) whereas among the antihypertensives manufactured in India, highest CR and %CV was observed with ARB group of drugs (Losartan 50mg CR: 32.31, %CV: 3131.47).[13] This is substantially higher than the results of our study. These differences may be because the drug prices in that study was obtained from different local retail stores, hospital pharmacies and wholesale importers based within Chitwan whereas our study only involved the retail pharmacies where only limited number of brands were available. The price of different brands of same generic name was found to be different although there is a policy to implicate same price but in Nepal it is found different. Another study by Shankar et al., regarding ambiguous pricing of Nepalese medicines, reported Enalapril, an antihypertensive drug to be among the top ten drugs list showing percentage price variation with a price variation of 51.5%, which is inconsistent with the result of study by Shrestha et al., which

reported the percentage price variation of Enalapril to be 25% as well as with the results of our study which reported the percentage price variation of Enalapril 5 mg tablet to be 37.25%.[8,14]

Among the analyzed antihypertensives manufactured in India, this study observed maximum percentage price variation with Metoprolol 50mg (90.75%) in case of single drug therapy whereas with Amlodipine 5mg + Telmisartan 40mg (91.85%) among combination preparations. This is inconsistent with the results of the study done in India by Harika et al., which reported highest percentage price variation of oral antihypertensives to be as high as 982.5% for Amlodipine 10mg tablet.[15] Another study by karve et al., also observed highest percentage cost variation with Amlodipine 5mg tab (1128.57%) and in case of combination therapy, with Amlodipine + Atenolol (5+50mg) tab: 673.79%.[12] Likewise, several other studies in India found maximum percentage price variation of oral antihypertensive agents to be greater than 500%.[16,17] Our study reported lesser percentage price variation of Indian brands of drugs than the studies conducted in India. This may be due to availability of a smaller number of Indian brand of antihypertensive drugs in Nepal than in India.

We also compared the cost of oral antihypertensive drugs manufactured by Nepalese and Indian pharmaceuticals. However, the result of Two-Sample t-Test (P value 0.18) showed no significant mean difference between price of Nepalese and Indian brands of oral antihypertensive drugs. Similar low-cost variation among Nepali to Indian antihypertensive drugs was observed in a study by Karki et al.[13] The possible reasons could be import related costs, transportation expenses, taxation, branding strategies and higher manufacturing and regulatory compliance cost.

Limitations of the Study: The study was confined to retail pharmacies in Bhairahawa and did not include tertiary care centers or government hospitals. Since only a limited range of oral antihypertensive agents were available in these pharmacies, not all antihypertensives could be analyzed.

CONCLUSION

This study exhibits variation in the price of oral antihypertensive drugs available in the retail pharmacies across Bhairahawa. Such significant price variation can further add to the economic burden of general population of developing countries like Nepal where majority of patients depend upon out-of-pocket payment to cover their health expenses. In view of this kind of issues, it is considered extremely necessary for government and other concerned authorities to develop and implement appropriate pricing systems for better price control of medicines without affecting the quality and availability of medicines. Transparent pricing policies can aid in lowering high cost of drugs and minimizing the price variation among different brands of same drug molecule. Considering the price of commonly prescribed oral antihypertensive drugs and patients' financial status before prescribing a drug by a physician as well as generic prescribing can help improve treatment access as well as affordability.

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