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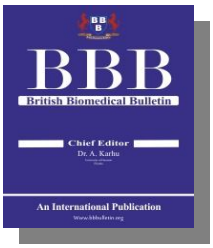

Original

Cost Analysis of Z-Drugs in Indian Market: A Pharmacoeconomic Study

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ABSTRACT

In the present era where diseases are prevalent in every country, affecting every strata of population, expenditure on medication creates a significant impact on an individual's income. Cost of drugs has to be given importance by health care professionals so as not to affect the economic status of the patient. Since insomnia is one of the prevalent diseases in India, a patient suffering from chronic insomnia may need to take hypnotics on regular basis. Z-compounds are commonly prescribed drugs for insomnia. In the following study, cost analysis of Z-drugs has been done in order to assess the cost range.

Materials And Methods: Five Z-drugs were included in this study - Zolpidem, Zopiclone, Eszopiclone, Zonisamide and Zaleplon. The cost of all the brands of these five Z-drugs available in Monthly Index of Medical Specialities (MIMS) during October 2013 were collected. 6 Cost has been expressed as Indian National Rupees per 10 tablets. Cost range, Cost ratio, Mean cost of generic drug was calculated.

Observations And Results: Single drug is available under multiple brands having wide cost range. Example: Zoplidem is available under 36 brands with cost range INR 26.67-78.00.

Conclusion: Prescription of costly brand could adversely affect a patient. Many times treating clinicians have no information about drug cost. Cost consideration by the clinician would be an added benefit for the patient.

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Introduction

Insufficient sleep is one of the most common health complaint encountered. More than one and half of the adult population in the USA experience intermittent sleep disturbance or occasional night of poor sleep or daytime sleepiness.[1]

Till recently it was believed that insomnia is prevalent only in the developed countries but a study conducted by Warwick medical schoolhas voided the above myth[2] . This study stated that 1 in 20 Indians suffer from sleep disorders. Lack of sleep could lead to serious impairment of daytime functioning. It could also contribute to or exacerbate medical or psychiatric conditions.[1] Thus, sleep disorders affect the national productivity indirectly by impairing the routine life of a patient. Hence sleep disorders must be treated to allow the patient to return to his normal life and therefore contributing to the economy of the nation.

Most of the sleep disorders are treated by sedative-hypnotics.Sedative is a drug that decreases activity, moderates excitement, and calms the subject. While hypnotic is a drug that induces drowsiness and facilitates the onset and maintenance of sleep from which the subject can be aroused easily.[3] Many times the above terms are used interchangeably as a sedative in higher dose could act as hypnotic and vice versa.

In the earlier times, alcohol, laudanum potions and various herbals have been used to induce sleep. During the 19th century, bromide was the first agent to be introduced specifically as a sedative-hypnotic. Later, phenobarbital was introduced in 1912. Followed by chlordiazepoxide in 1961 which opened the era of benzodiazepines.[3]Since then benzodiazepines have replaced all other sedative-hypnotics.

Benzodiazepines (BDZ) promote the binding of the major inhibitory neurotransmitter γ-aminobutyric acid (GABA) to the $GABA_A$ receptors. These receptors are multi-subunit, ligand-gated chloride channels. Benzodiazepines enhance the GABA-induced ionic currents through $GABA_A$ channels.[3]It has been suggested that BDZ's act through BZ_1 and BZ_2 receptors on $GABA_A$ channel. BZ_1 is supposed to be responsible for sedative and hypnotic action and BZ_2 for muscle relaxant action. This could be the explanation for BDZ's sedative and muscle relaxant action.[4]

Non benzodiazepine hypnotics or Z-compounds or Z-drugs as they are sometimes referred to act selectively on BZ_1 receptor exhibiting only sedative-hypnotic activity but no muscle relaxant action. Drugs in this class include zolpidem, zaleplon, zopiclone and eszopiclone. Since almost a decade, Z drugs have largely replaced benzodiazepines in the treatment of insomnia because of their safety and these drugs have less potential for dependence and abuse than benzodiazepines unless used for prolonged periods and at higher doses.[3]

In many cases of insomnia, Z-drugs could be required for prolonged periods, either continuously or intermittently. Many cases of insomnia also suffer from other co-morbid conditions like hypertension, diabetes or dyslipidemia. Treatment for these latter conditions adds to financial burden on the patient. Further adding a sedative would increase the burden of treatment. As of already insomnia contributes to reduction in country's gross production by impairing the patient's routine occupation. Slightest change in the cost of z-drugs could provide financial relief to the patient. In India, expense on health contributes to more than 5% of the total expenditure of a household.[5] This trend supports cost effective practice by physician. The prescription of drugs in brand names by physicians and availability of multiple brands for the same generic drug highlights the importance of pharmaco-economic study.The present study aims towards survey of drug cost by calculating cost range and cost ratio. This study would help to find out cost-effective treatment with respect to Z-drugs, thus resulting in compliance to treatment and impact on national gross productivity.

Materials and Methods

Five Z-drugs were included in this study - Zolpidem, Zopiclone, Eszopiclone, Zonisamide and Zaleplon which are available in Indian market. The cost of all the brands of these five Z-drugs available in Monthly Index of Medical Specialities (MIMS) during October 2013were collected. [6]Cost has been expressed as Indian National Rupees per 10 tablets.

Cost range, Cost ratio, Mean cost of generic drug was calculated.

The cost range has been expressed as minimum cost per ten tablets to maximum cost per ten tablets. The cost ratio has been calculated as quotient of maximum cost over minimum cost. The mean cost of generic drug has been calculated as sum of the costs of all its brand names divided by total number of brands available for the same generic drug.

Observations and Results

It was observed that there are 36 brands of Zolpidem, 6 of Zopiclone, 5 of Eszopiclone, 5 of Zonisamide, 5 of Zaleplon. [Graph 1]

Zolipdem has 4 dose variants - 5 mg, 6.25 mg, 10 mg and 12.5 mg; Zonisamide has 3 dose variants - 25 mg, 50 mg and 100 mg; Zaleplon has 2 dose variants – 5 mg and 10 mg; Eszopiclone has 2 variants – 1 mg and 2 mg; while Zopiclone is available in only 1 variant – 7.5 mg. [Graph 2]

Many of these drugs have very wide cost range (INR) which could be attributed to their number of brands. For example, Zolipdem which has the highest number of brands have the following cost range - 5 mg : INR 41.10, 6.25 mg : INR 33.28, 10 mg : INR 51.33, and 12.5 mg : INR 41.97 . While Zonisamide 100 mg which is available under 5 brand names has a cost range (INR) of INR 72.03. Likewise Zaleplon 10 mg which is available under 5 brands has a cost range (INR) of INR 21.20 ; and Zopiclone 7.5 mg, available under 5 brands has a cost range (INR) of : INR 20.12. [Graph 3]

Cost ratio chart gives us an idea about how many times is the costlier brand expensive than the cheapest brand of the same drug. [Graph 4] For example, cost ratio of Zolpidem 5 mg is INR 5.15 which means costliest brand of zolpidem 5 mg (Zolfresh) is 5.15 times costlier than its cheapest counterpart (Inzofresh).

Data has been enlisted in Table 1 mentioning Minimum cost, Maximum cost, Cost range, Cost ratio, Mean cost, against each dose variant of the drug. The last column mentions number of brands under which that particular dose variant is available in Indian market.

Discussion and Conclusion

The United Nations Development Programme stated in a report in 2010 that 29.8% of Indian population is below the nation's poverty line.[7] Expenditure on drugs becomes a major financial burden on below poverty line families. Cost of drugs should be given importance in health care decision making in accordance with socio-economic background.

Insomnia is quite prevalent in India [2] and the numbers of cases are increasing day by day. As stated already, lack of sleep leads to impaired functioning of the patient in daytime which leads to decrease in number of work days, increase in absence from work, leading to loss of pay. Prescribing costly medication to a sleep deprived patient could transform the patient to a money deprived patient as the patient tends to loose wage due to his day time somnolence and spends his saved money on medicine. Even if the symptoms are controlled its being done at the cost of poverty which could further push the patient into depression. Loss of work days leads to decrease in productivity which contributes to lower

Gross Domestic Production. Hence indirectly the country's economy is affected as a result of costly medications.

In the present study, it has been observed that many drugs have wide cost range especially those drugs that are available under many brand names but even those drugs that are available under fewer brands had costs with great difference.

At time treating clinicians have less information about drug cost. Economic analysis application would help in therapeutic decision making, formulary decision making, program justification, drug policy decisions and treatment guidelines.[8] Clinicians should be informed about the cost effective drugs and about the economic situation of their treating population. Preferably, generic names should be written in prescription. Legislation could be implemented to keep the drug costs under control. Cost to attain therapeutic goal should be as less as possible to attain patient's compliance.

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Table 1. Cost Analysis of Z-Drugs

S.No.	DRUG	DOSE (mg)	Minimum Cost (INR)	Maximum Cost (INR)	Cost Range	Cost Ratio	Mean Cost (INR)	Total No. Of Brands
1	Zolpidem	5	9.9	51	41.1	5.15	30.45	28
		6.25	48.67	81.95	33.28	1.68	65.31	3
		10	26.67	78	51.33	2.92	52.34	30
		12.5	60.88	102.85	41.97	1.69	81.86	3
2	Zopiclone	7.5	36.75	56.87	20.12	1.55	46.81	6
3	Eszopiclone	1	42	47	5	1.12	44.5	4
		2	61	68.1	7.1	1.12	64.55	4
4	Zonisamide	25	28.34	32	3.66	1.13	30.17	2
		50	55.98	59.4	3.42	1.06	57.69	3
		100	87.97	160	72.03	1.82	123.98	5
5	Zaleplon	5	23.8	35.25	11.45	1.48	29.52	5
		10	39.2	60.4	21.2	1.54	49.8	5

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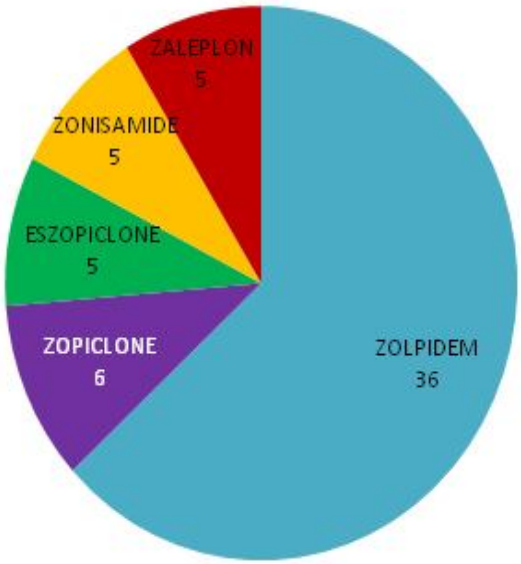
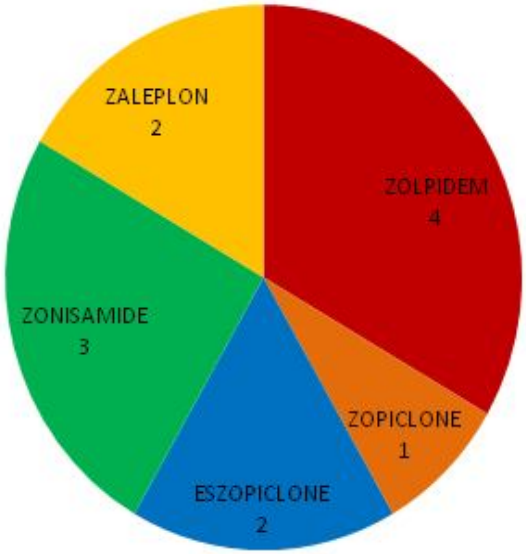
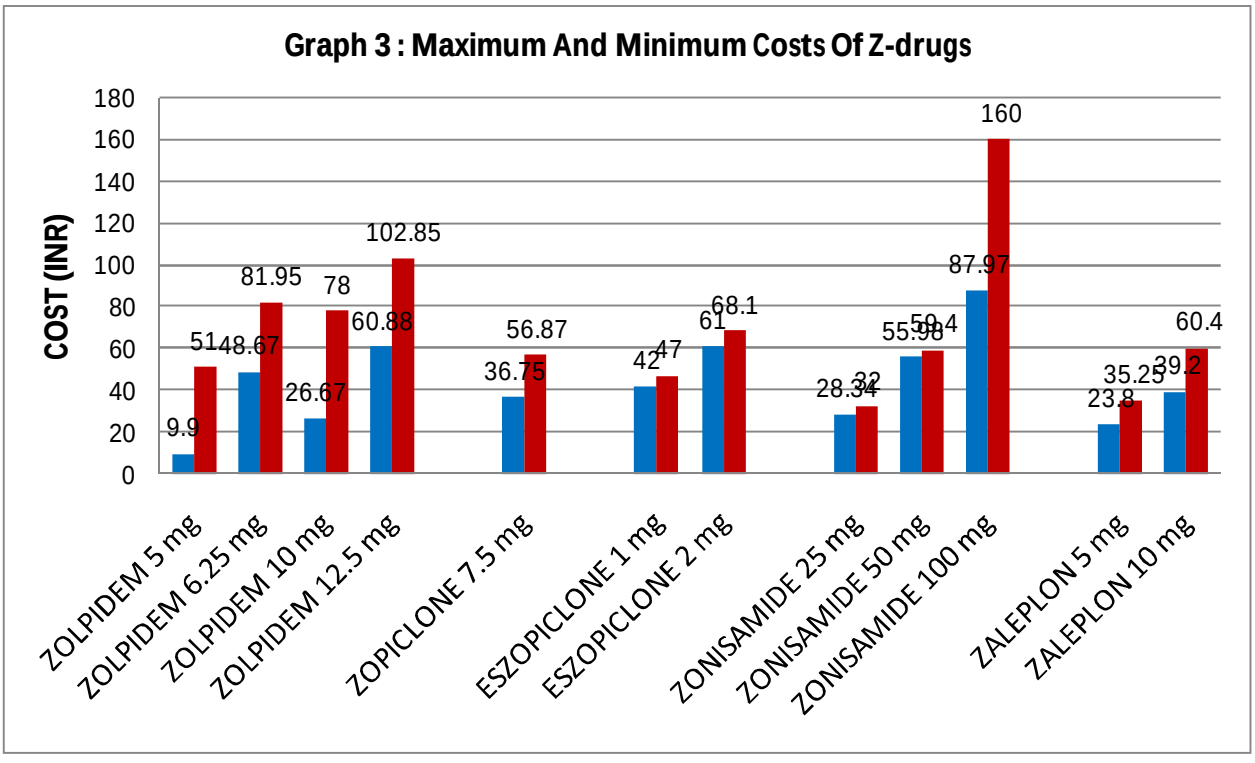


Graph 1. Number of brands of Z-drugs



Graph 2. Number of dose variants of Z-drugs



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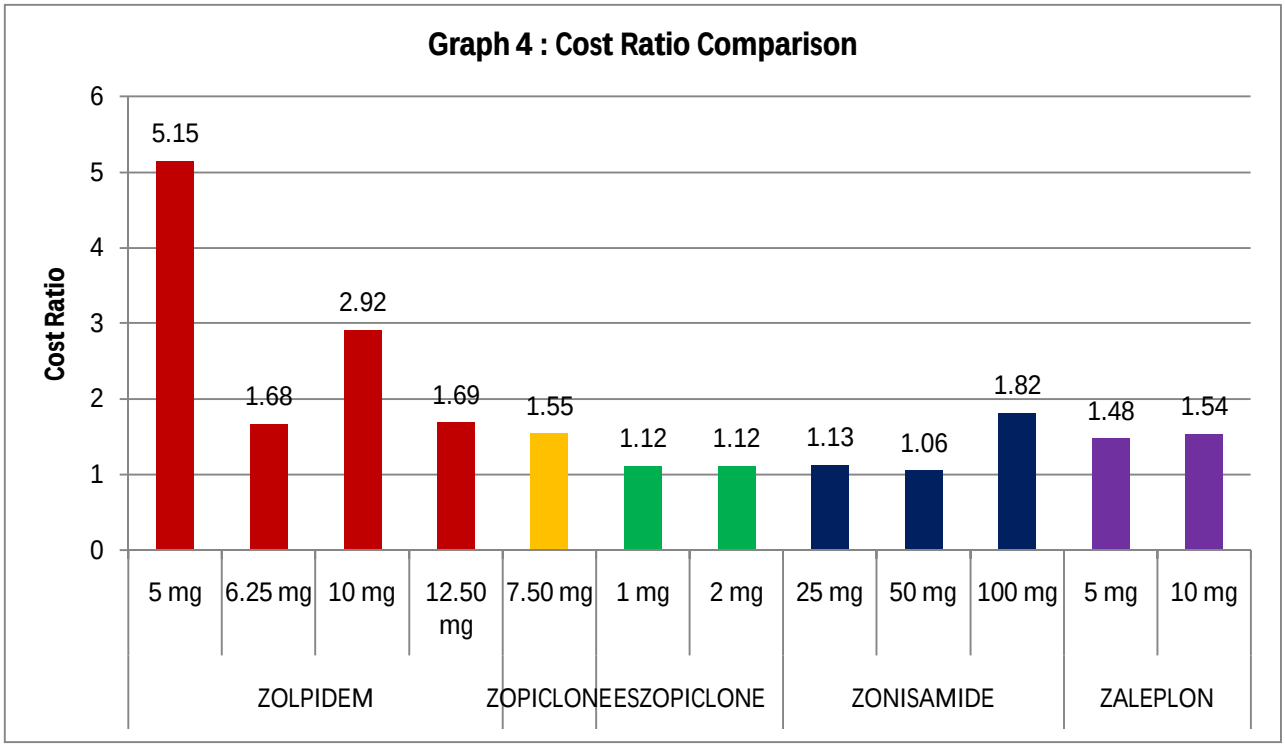

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