



## Cost Analysis of Oral Anti-Depressants Available in the Indian Market

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### ABSTRACT

**Objective:** Cost analysis of oral anti-depressants available in the Indian market.

**Methods:** This was conducted as a cross-sectional analysis by the department of pharmacology between January and March 2019. Details regarding the dosage, formulations and cost of a particular drug being manufactured by different companies, in the same strength and dosage forms, was obtained from “Current Index of Medical Specialties” 2018 – Jan 2019. Using the maximum and minimum cost of drugs of a dosage and strength produced by different companies, the variation in market price of drug has been calculated.

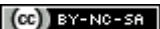
**Results:** Our study analysed the cost of 27 different anti-depressants available as 18 single and 9 combination preparations available in 135 different formulations. For the group of TCAs, the maximum variation in price is 354% for Tablet Amitriptyline 50g while no variation was seen in all available formulations of Doxepin and Nortriptyline. Out of all SSRI's there maximum price variation of 191% for Escitalopram 10mg, while no variation is seen in all formulations of Citalopram, Fluoxetine 40mg, Fluvoxamine 25mg and 200mg and Paroxetine 40mg. For SNRI's there is maximum price variation of 76% for Duloxetine 30mg and a minimum variation of 11.39% for Duloxetine 40mg. Finally, for atypical anti-depressants, a maximum of 91.4% variation in price is seen for Mirtazapine 7.5mg, while no variation is seen in the prices of all formulations of Bupropion and Mianserin.

**Conclusion:** The study shows a wide variation in the price of oral anti-depressants available in the Indian market. Highlighting the need for more stringent measures by the government to improve the affordability and standardise the cost of all formulations of oral anti-depressants. Especially for the drugs falling under the essential drug list.

**Keywords:** Oral Anti-Depressants, Cost Analysis, Indian Market.

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## INTRODUCTION

According to a recent survey, Indian consumption of antidepressants has sky rocketed in 2016, with around 10.6 lakh more prescriptions for antidepressants written in comparison to 2015. This is indicative of a 14% increase in the prescription pattern of this group of drugs. (1) In the national mental health survey done in 2015-2016, 15% of Indian adults that is 1 in 20 adults were seen to suffer from depression. Furthermore the prevalence of depression was seen to be higher in patients between 40-49 years of age. (2) With one of the largest affected populations in the world, the Indian pharmaceutical market has expanded to become the 3rd largest market in terms of volume and 13th largest in terms of value. (3) This being said, despite large scale production of drugs patients are unable to purchase these drugs because of the high cost.

Each drug is sold under different formulations and dosages by different manufacturers at a different price. The same formulation of a drug having the same dosage is sold at higher cost by different brands. Effectively there is a wide disparity between the market prices of similar formulations of drugs. (4) In this regard, patient compliance to therapeutic regimen is altered, as the most significant factor affecting patient compliance, is affordability of treatment. (5) It has been shown that anti-depressant therapy is more economical for the patient (6), however due to increasing cost of the drugs, patients are ill inclined to follow through with the course of treatment, or are financially unable to. (7) Another point of contention among physicians is regarding prescription of antidepressants having the same dosage and

composition, differing only in cost. Many a times there is preferential prescription of the more expensive brand of drug.

In a country like India where a large proportion of the population is afflicted with depression and most of the population lives below the poverty line, it becomes imperative to standardise the cost of antidepressants. Hence this study has been done to evaluate the cost of all antidepressants being marketed in India and analyse the variation in cost. The institution of changes in price ceilings for sale of antidepressants may aid in the standardisation of market prices of identical formulations of the drug having the same dosage. Thereby enabling patients to adhere to a more affordable treatment regimen.

## METHODOLOGY

The study was conducted as a cross-sectional analysis by the department of pharmacology between January and March 2019. Details regarding the dosage, formulations and cost of a particular drug being manufactured by different companies, in the same strength and dosage forms, was obtained from "Current Index of Medical Specialties" 2018 – Jan 2019. Using the maximum and minimum cost of drugs of a dosage and strength produced by different companies, the variation in market price of drug has been calculated.

**Data Analysis:** The maximum and minimum cost of a formulation of an antidepressant having a specific dosage is taken. The percentage variation in cost of drug is calculated using the following formula.

$$\text{Percentage variation} = \frac{\text{Maximum cost} - \text{Minimum cost}}{\text{Minimum cost}}$$

The findings are expressed as numbers and percentages in the form of tables. Tabulation of the data has been done using Microsoft excel spreadsheets.

**Table 1.1: Price variation of all available single drug anti-depressants**

Drug	Formulations (n)	Dose (mg)	Minimum cost (INR)	Maximum cost (INR)	Percentage variation in cost (%)
<b>SSRI</b>					
<b>Citalopram</b>	2	10	38.5	38.5	0
		20	67	67	0
		40	118	118	0
<b>Escitalopram</b>	18	5	23.8	48.05	101.89
		10	30	87.35	191.16
		20	75	142	89.3
<b>Fluoxetine</b>	11	10	21	30.24	44
		20	27	57.46	112.84
		40	48	48	0
		60	59	99.46	68.57

<b>Fluvoxamine</b>	4	25	65	65	0
		50	102.6	135	31.57
		100	183	246	34.42
		200	140	140	0
<b>Paroxetine</b>	9	10	77.8	123.2	58.35
		12.5	90	129.52	43.9
		20	110.2	175.45	59.21
		25	118	179	51.69
		30	155.5	217.8	38.13
		37.5	190	233.2	22.73
		40	170	170	0
<b>Sertraline</b>	10	25	20.4	52	15.49
		50	38.6	78.65	103.75
		100	55.5	110	98.19
<b>SNRI's</b>					
<b>Duloxetine</b>	9	20	45	73.8	64
		30	71	125	76.05
		40	79	88	11.39
		60	119.5	135	12.97
<b>Venlafaxine</b>	6	37.5	36.85	44	19.4
		75	60	86	43.33
		150	107.8	164.45	52.55
<b>TCA's</b>					
<b>Amitriptyline</b>	15	10	11	23.29	11.17
		25	16	23.29	45.56
		50	19.5	88.54	354.05
		75	31	58	87.09
<b>Doxepin</b>	1	75	44.75	44.75	0
		25	82.8	82.8	0
<b>Dosulepin</b>	5	75	17	41	141.1
		25	27	61	125.9
		50	39	87	123.07
<b>Imipramine</b>	4	25	8.07	10	23.91
		50	17	17	0
		75	21	23.21	10.52
<b>Nortriptyline</b>	1	10	14	14	0
		25	21.75	21.75	0
		50	45	45	0
<b>Others</b>					
<b>Amoxapine</b>	3	50	43.8	58.85	34.3
		100	81.16	107.8	32.82
<b>Bupropion</b>	1	150	77	77	0
<b>Mianserin</b>	1	10	35.5	35.5	0
		30	85	85	0
<b>Mirtazapine</b>	5	7.5	35	67	91.4
		15	60	80	33.33
		30	115	168	46.08
<b>Trazodone</b>	2	25	18	23.65	31.38
		50	32	46	43.75
		100	41	62	51.219

**Table 1.2: Price variation of TCA's:**

Drug	Formulations (n)	Dose (mg)	Minimum cost (INR)	Maximum cost (INR)	Percentage variation in cost (%)
<b>TCA's</b>					
<b>Amitriptyline</b>	15	10	11	23.29	11.17
		25	16	23.29	45.56
		50	19.5	88.54	354.05
		75	31	58	87.09
<b>Doxepin</b>	1	75	44.75	44.75	0
		25	82.8	82.8	0
<b>Dosulepin</b>	5	75	17	41	141.1
		25	27	61	125.9
		50	39	87	123.07
<b>Imipramine</b>	4	25	8.07	10	23.91
		50	17	17	0
		75	21	23.21	10.52
<b>Nortriptyline</b>	1	10	14	14	0
		25	21.75	21.75	0
		50	45	45	0

**Table 1.3: Price variation of SSRI's**

Drug	Formulations (n)	Dose (mg)	Minimum cost (INR)	Maximum cost (INR)	Percentage variation in cost (%)
<b>SSRI'S</b>					
<b>Citalopram</b>	2	10	38.5	38.5	0
		20	67	67	0
		40	118	118	0
<b>Escitalopram</b>	18	5	23.8	48.05	101.89
		10	30	87.35	191.16
		20	75	142	89.3
<b>Fluoxetine</b>	11	10	21	30.24	44
		20	27	57.46	112.84
		40	48	48	0
		60	59	99.46	68.57
<b>Fluvoxamine</b>	4	25	65	65	0
		50	102.6	135	31.57
		100	183	246	34.42
		200	140	140	0
<b>Paroxetine</b>	9	10	77.8	123.2	58.35
		12.5	90	129.52	43.9
		20	110.2	175.45	59.21
		25	118	179	51.69
		30	155.5	217.8	38.13
		37.5	190	233.2	22.73
<b>Sertraline</b>	10	40	170	170	0
		25	20.4	52	15.49
		50	38.6	78.65	103.75
		100	55.5	110	98.19

**Table 1.4: Price variation of SNRI's**

Drug	Formulation	Dosage(mg)	Minimum Cost(INR)	Maximum Cost(INR)	Percentage Variation in Cost (%)
SNRI'S					
Duloxetine	9	20	45	73.8	64
		30	71	125	76.05
		40	79	88	11.39
		60	119.5	135	12.97
Venlafaxine	6	37.5	36.85	44	19.4
		75	60	86	43.33
		150	107.8	164.45	52.55

**Table 1.5: Price variation of atypical anti-depressants**

Drug	Formulations (n)	Dose (mg)	Minimum cost (INR)	Maximum cost(INR)	Percentage variation in cost (%)
Others					
Amoxapine	3	50	43.8	58.85	34.3
		100	81.16	107.8	32.82
Bupropion	1	150	77	77	0
Mianserin	1	10	35.5	35.5	0
		30	85	85	0
Mirtazapine	5	7.5	35	67	91.4
		15	60	80	33.33
		30	115	168	46.08
Trazodone	2	25	18	23.65	31.38
		50	32	46	43.75
		100	41	62	51.219

**Table 2: price variation of fixed dose combinations of anti-depressants**

Fixed drug combination	Formulation (n)	Dose (mg)	Minimum cost (INR)	Maximum(INR)	Percentage variation in cost (%)
Amitriptyline + Methyl cobalamin	1	10+1500mcg	125	125	0
Chlordiazepoxide + Amitriptyline	18	10+25	13.4	142	959
		5+12.5	14	27.5	96.4
Diazepam +Imipramine	3	5+25	22	22	0
		2+25	13.2	15	13.63
Pregabalin+ Nortriptyline	1	75+10	139.7	139.7	0
Imipramine + Chlordiazepoxide	1	25+10	9.7	9.7	0
Clonazepam + Escitalopram	11	0.5+10	69	110	59.42
		0.25+5	50	50	0
		0.25+10	72	75	4.1
		0.5+5	62	62	0
Clonazepam + Escitalopram Oxalate	10	0.5+10	70	98	40
		0.5+5	79	79	0
		0.25+10	66	66	0

		0.25+5	50	60	20
<b>Etizolam + Escitalopram</b>	5	0.5+10	89.1	119	33.56
		0.5+5	69.3	88	26.98
		0.25+5	75	75	0
		0.25+10	99	99	0
<b>Escitalopram + Flupentixol</b>	1	10+0.5	68	68	0
		5+0.5	79	79	0

## RESULTS

Our study analysed the cost of 27 different anti-depressants available as 18 single and 9 combination preparations available in 135 different formulations.

**Single Drug Therapy:** Table 1 shows the percentage variation in price of TCA's, SSRI's, SNRI's, and other atypical anti-depressants. Table 1.2 shows price variation for TCA's, in which the maximum variation in price is 354% for Tablet Amitriptyline 50g while no variation was seen in all available formulations of Doxepin and Nortriptyline. Table 1.3 shows price variation for SSRI's in which maximum price variation of 191% for Escitalopram 10mg, while no variation is seen in all formulations of Citalopram, Fluoxetine 40mg, Fluvoxamine 25mg and 200mg and Paroxetine 40mg.

Table 1.4 shows price variation for SNRI's in which the maximum price variation of 76% for Duloxetine 30mg and a minimum variation of 11.39% for Duloxetine 40mg. Finally, table 1.5 shows price variation for atypical anti-depressants, in which a 91.4% variation in price is seen for Mirtazapine 7.5mg, while no variation is seen in the prices of all formulations of Bupropion and Mianserin.

**Combination Drug Therapy:** Table 2, shows price variation 9 fixed drug combinations having 51 different formulations, a maximum price variation of 959% is seen in Chlordiazepoxide(10mg) + Amitriptyline (25 mg) formulation. The least variation is seen for the following formulations, Amitriptyline(10mg)+Methylcobalamin(1500cg), Diazepam(5mg)+Imipramine(25mg), Pregabalin(75mg)+Nortriptyline(10mg), Imipramine(25mg)+Chlorediazepoxide(10mg), Clonazepam(0.25mg)+Escitalopram(5mg), Clonazepam(0.5mg)+Escitalopram(5mg), Clonazepam(0.5mg)+Escitalopram oxalate(5mg), Clonazepam(0.25mg)+Escitalopram oxalate(10mg), Etizolam (0.25mg)+Escitalopram(5mg), Etizolam (0.25mg)+Escitalopram(10mg), Escitalopram(10mg) +

Flupentixol(0.5mg), Escitalopram(5mg) + Flupentixol(0.5mg)

## DISCUSSIONS

This study's findings were found to be similar to those conducted by Pauniker et al, and Kamath et al. both these studies showed a variation in the price of anti-depressant available in the market. All groups of anti-depressants were analysed and a similar pattern of variation in the cost of the different formulations of the same drug were seen.

Depression is an omnipresent mental disorder, afflicting millions of people worldwide. More so in India where 1 in 20 individuals suffer from depression. As such anti-depressants have come to represent a large sector of the Indian as well as the global pharmaceutical market. So much so that these drugs have earned a spot in the essential drugs list of the WHO as well as that of the state of Tamil Nadu. According to the 2019 edition of the WHO essential medicines list the anti-depressants Fluoxetine 20 mg (as hydrochloride) and Amitriptyline (25 mg; 75mg hydrochloride) are also considered part of this list.(8)

In the state of Tamil Nadu, the essential drug list includes Amitriptyline 25mg at the price of 18.7INR for 10 tablets( according to 2018 values) (9) Our study shows that amitriptyline is available at a minimum cost of 16 INR and a maximum cost of 23.6INR for 10 tablets indicative of a 45.56% percentage variation in the cost of the drug. The WHO prescribed essential drug fluoxetine 20mg, is marketed in India at a minimum cost of 27 INR and maximum cost of 57.46INR, showing a price variation of 112%.

Price variations of drugs especially essential drugs increase the financial burden of patients to whom they are prescribed as they may unknowingly purchase the costlier formulations of the drug. furthermore, patients diagnosed with depression commonly follow a once daily dose regimen. Thus, even slight variations in the cost of the drug can result in a drastic fall in affordability of treatment. This in turn reduces patient follow through and

increases non-compliance to the regimen. Currently the government regulates prices of drugs using the DPCO, the drug prices control order. The way by which price regulation occurs is by keeping maintaining a price ceiling for a drug by taking an average of prices of brands of the drug having more than 1% of market share. However this is not seen to be a conclusive solution for pricing of essential drugs.(10)

More stringent measures must be put in place to keep a check on the prices of these drugs, especially formulations and dosages that are enlisted under the essential drugs list. community level of the pharmacist, they must be made aware of the need to stop prescribing costlier drugs over

the cheaper alternatives available. Together these steps will help curb the financial burden of the patients. The limitations of this study is that parenteral anti-depressant formulations were not analysed for variation in price.

## CONCLUSION

The study shows a wide variation in the price of oral anti-depressants available in the Indian market. Highlighting the need for more stringent measures by the government to improve the affordability and standardise the cost of all formulations of oral anti-depressants. Especially for the drugs falling under the essential drug list.

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