

## DRUG UTILIZATION PATTERNS AND COST CONTROL IN DIFFERENT PSYCHIATRIC DISORDERS.

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### **Abstract**

**Background:** Drug utilisation research (DUR) evaluates drug use across various nations and regions and is used to evaluate the efficacy of the drug therapy prescription pattern. In light of this context, antipsychotic medications are assessed for prescribing patterns and cost management in mental patients at a tertiary care facility.

**Materials and Methods:** For six months, a retrospective cross-sectional study was carried out in the outpatient psychiatry unit of a tertiary care hospital. Psychiatric patient prescription patterns and drug costs were examined using World Health Organization (WHO) drug indicators.

**Results:** Among 600 prescriptions, 1708 (90.37%) were for medications with a psychoactive effect. The NLEM's utilisation rate was 41.5%. 21% of the prescriptions comprised psychotropic FDCs, with the average number of psychotropic medications per prescription being 2.84. Patterns of drug use among various psychiatric diseases – Trihexyphenidyl (15.60%), Clonazepam (22.80%), and Clonazepam (13.98%) were the most often given medications for schizophrenia, anxiety disorders, and mood disorders, respectively.

Haloperidol (1.69%), Quetiapine (1.26%), Etizolam, and Fluoxetine (2.08%) were the medications that were prescribed the least frequently.

**Conclusion:**Overall, the rational prescribing principles were adhered to in accordance with the numerous drug usage indicators listed by WHO/INRUD. Due to socioeconomic factors, financial limitations, and technical challenges, several variations from the recommendations (APA and NICE) were discovered. Cost control survey for various psychiatric drugs was also conducted.

**Keywords:**Drug utilization, antipsychotic drugs, Prescription pattern, disorders and Cost control.

## Introduction

Mental and behavioral disorders<sup>(1)</sup> account for approximately 12% of the worldwide disease burden. They consist of a variety of conditions, such as obsessive and compulsive disorders, schizophrenia, affective disorders, and depressive disorders<sup>(2)</sup>. Four of the top 10 health issues responsible for DALYs (disability adjusted life years) are psychiatric diseases. Even the most basic mental health care cannot be provided by the health systems of the majority of underdeveloped nations. Mental illness is linked to high rates of health service use and associated<sup>(3)</sup> expenses, particularly in developing nations; the patient is mostly responsible for these costs. A number of recommendations on how to improve care for PWMDs are made in the World Health Report 2001 (WHO 2001a), including increasing access to a small number of crucial psychotropic medications. They are chosen with consideration for their relevance to public health, proof of effectiveness<sup>(4)</sup> and safety, and comparative cost-effectiveness. Psychotropic drugs that "meet the population's top-priority needs for mental health care" are considered essential. Not every "effective" medication is "necessary" for treating mental illnesses.

## Psychiatric Disorders

Psychiatric disorders<sup>(5)</sup> are defined as "Any condition characterized by cognitive and emotional abnormalities, aberrant behaviors, reduced functioning, or any combination of these" by the American Psychological Association. Such illnesses may entail physiological, genetic, chemical, social, and other elements and cannot be entirely attributed to environmental conditions. Also known as psychological disorder, psychiatric disorder, and mental sickness.

**Depression:** It is one of a mood disorder that results in persistent feeling of sadness and loss of interest. The American Psychiatric Association's Diagnostic Statistical Manual of Mental Disorders<sup>(6, 7)</sup>, Fifth Edition (DSM-5) classifies the depressive disorders into -Disruptive mood dysregulation disorder, Major depressive disorder, Persistent depressive disorder (dysthymia), premenstrual dysphoric disorder and Depressive disorder due to another medical condition.

**Treatment:** Depression symptoms were treated with medication (SSRI, SNRI, MAOI, Atypical, and tricyclic antidepressants), psychotherapy, such as cognitive behavioural therapy, and interpersonal therapy alone. Combination therapy raised quality of life, reduced depression symptoms, and improved treatment compliance<sup>(10, 11)</sup>. Electroconvulsive therapy is beneficial for those with suicidal tendencies and patients who are not responding to drugs<sup>(12, 6)</sup>.

**Generalized Anxiety Disorder:** It is characterised by a continuous sense of worry over trivial matters, fear, and overwhelming feelings that may be related to family, finances, health, and the future. It is excessive, challenging to manage, and frequently accompanied by a wide range of vague psychological and physical symptoms. The hallmark of generalised anxiety disorder<sup>(13, 14, 15)</sup> is excessive worry.

**Treatment:** The two main treatments for anxiety are cognitive behavioural therapy and pharmaceuticals (SSRI, SNRI, and antipsychotics). A combination of the two might be most advantageous for patients<sup>(19, 20, 21)</sup>. Psychoeducation, altering unhelpful thought habits and gradual exposure to anxiety-inducing circumstances are all parts of cognitive behavioural therapy. Pharmacotherapy- Benzodiazepines, antipsychotics, and antidepressants.

**Schizophrenia:** It is a psychotic disorder characterized by hallucinations, delusions, and disturbances in thought, perception and behaviour.

**Treatment:** An oral second-generation antipsychotic (SGA), such as Aripiprazole, Olanzapine, Risperidone, or Quetiapine, is the first line of treatment for acute psychosis.

In the event of treatment resistance, clozapine is employed. Electroconvulsive therapy (ECT) and cognitive behavioural therapy (CBT).

### **Bipolar Affective Disorder**

Bipolar disorder is a chronic, multifaceted mood illness that includes phases of manic (bipolar mania), hypomanic (bipolar depression), and depressive (bipolar depression) moods as well as significant subsyndromal symptoms that frequently appear between major mood events <sup>(24)</sup>. There are two types of bipolar. Early mortality, significant degrees of functional disability, poor quality of life, and serious medical and mental comorbidity have all been reported to be associated with bipolar 1 illness <sup>(25)</sup>. It requires at least one lifetime manic episode, while bipolar 2 disorders also require at least one major depressive episode and one hypomanic episode.

**Treatment:** Mood stabilisers and antipsychotics for acute stage, the gold standard for the procedure is Lithium. Mood-stabilizing anticonvulsants include Carbamazepine and Valproic acid. The primary goals of long-term management include preventing relapses of episodes, maintaining functionality, and maximising the course of therapy, which includes a mood stabiliser alone or in conjunction with an antipsychotic or an antidepressant as well as specialised psychosocial therapies.

**Obsessive-Compulsive Disorder:** Obsessive-compulsive disorder (OCD) is characterised by intrusive thoughts and compensatory behaviours obsessions and compulsions that are used to reduce the stress caused by the intrusive thoughts.

**Treatment:** SSRIs and cognitive behavioural therapy (CBT) using exposure and response prevention are used to treat OCD (ERP). Clomipramine, a tricyclic antidepressant (TCA), is the initial treatment options are Serotonin and glutamate are two important neurotransmitters that are hypothesised to play a role in OCD.

In the present study, Drug use studies are monitored that are aim to track, assess, and, if necessary, suggest changes to prescribing practises to make healthcare sensible and affordable <sup>(51)</sup>. To guarantee safe and efficient therapy, this calls for a regular examination of drug use patterns <sup>(52)</sup>. Only a few numbers of researches have examined the antipsychotic prescribing trends in India. The information is from public hospitals and reflects the prescribing behaviour unique to that facility <sup>(53)</sup>. The way that medications are prescribed for psychotic disease is evolving, and it is also easy to spot significant discrepancies between research trials and actual practice <sup>(56)</sup>. Therefore, it is crucial to conduct pharmacoepidemiologic studies such as Drug Usage Study over Time. In light of this context, the current study was created to describe and evaluate the use of antipsychotics and its prescribing pattern in an Indian tertiary care hospital.

## Materials and Methods

**Study design:** A retrospective cross sectional DUS was conducted with the approval of Institutional Ethics Committee (IEC).

**Study area:** This study was conducted in Psychiatric outpatient department of Narayana medical college & hospital, Sree mind centre, Brain wave hospital, Spandanachikitsalaya, Nellore, Andhra Pradesh, India.

**Study period:** The study was conducted over a period of 6 months from December 2020 to May 2021

**Study population:**All patients attending the psychiatry OPD during the period of the study were included and analysed

### Selection criteria

**Inclusion criteria:** Prescriptions of patients of both sexes and all ages, suffering from a psychiatric illness and started on at least one psychotropic drug, were selected

**Exclusion criteria:**Patients who are not willing to participate in the study.

**Sampling size:**A total of 600 prescriptions were selected. All patients attending the psychiatry OPD during the period of the study were included and analysed

**Data collection:** The following data were collected in specially designed proforma which includes: Patients details like age, gender, Patient diagnosis, Prescription details like prescription date, number of drugs, the name of the individual drugs, dosages, dosing schedule and duration of drugs.

**Data analysis:**Assessment of prescription patterns as per the WHO-INRUD drug use indicators<sup>(57)</sup>.

**Ethical considerations:** The ethical approval was obtained from the Institutional Ethical Committee (IEC) before the commencement of the study. The confidentiality of the subject is kept. The details of the study are explained to the study participants, after their acceptance they were involved in the study. Name of the participant and any participant's identifiers were not collected.

## Results

This study was carried in the way to assess the prescribing pattern of psychotropic drugs. In present study, 600 prescriptions contained 1890 drugs, out of which psychotropic drugs were 1708. More male patients visited the psychiatry OPD compared to females. Many studies have reported a similar finding<sup>(58, 59, 60)</sup>. The reproductive age group (20–40 years) accounted for the majority of all the psychiatric disorders. The average number of psychotropic drugs per prescription was 2.84, which was relatively high compared to similar studies, where it ranged from 1.3 to 2.1 drugs per prescription<sup>(58, 59, 61)</sup>. Few prescriptions were found to have more than five drugs, which indicate that polypharmacy was practiced. Polypharmacy can lead to poor compliance, drug interactions, adverse drug reactions, under-use of effective treatments and medication errors.

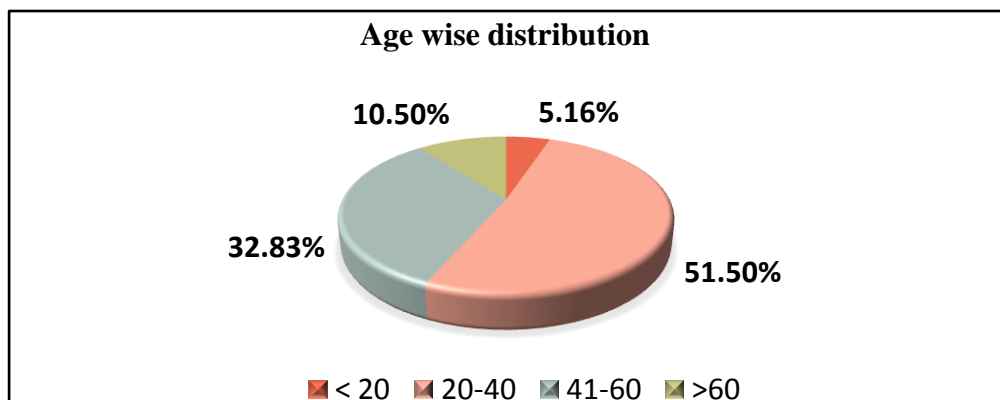
### The most commonly prescribed Fixed Drug Combinations (FDCs):

Fluoxetine and Olanzapine, Risperidone and Trihexyphenidyl, and Clonazepam and Escitalopram. Utilization of drugs from the essential medicines list (Indian & WHO) was very high. The primary purpose of NLEM is to promote rational use of medicines considering the three important aspects i.e., cost, safety and efficacy.

### The Gender and Age characteristics of the patients

**Table 1: Age Wise Distribution**

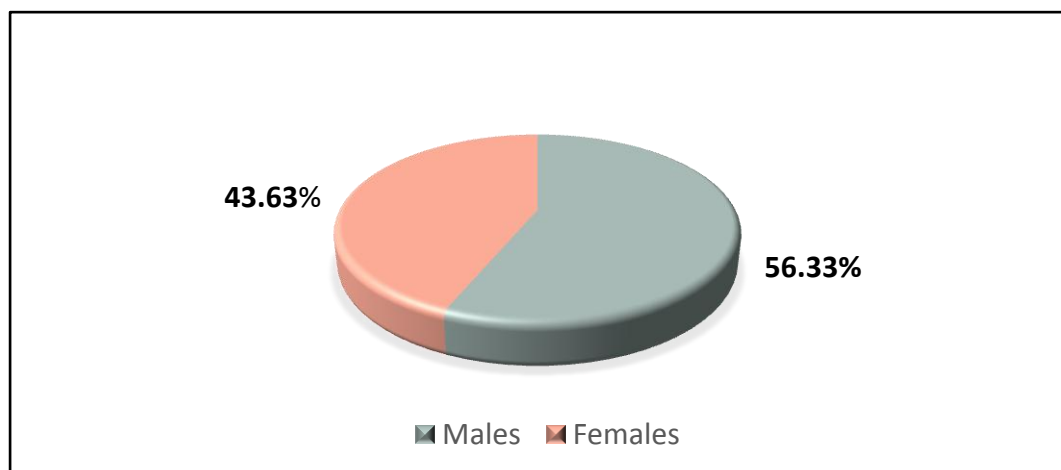
Age (Years)	No. of Patients	Percentage (%)
< 20	31	5.16%
20-40	309	51.50%
41-60	197	32.83%
>60	63	10.50%



**Figure-1: Age wise distribution**

**Table 2: Sex Wise Distribution**

Gender	No. of Patients	Percentage (%)
Males	338	56.33%
Females	262	43.63%



**Figure-2: Sex wise distribution**

**Table 3: Pattern of psychiatric disorders of Psychiatric Disorder**

Psychiatric Disorder	No. of Patients	Percentage
Anxiety disorders	110	18.30%

Schizophrenia & other Psychoses	152	25.30%
Mood disorders	211	35.16%
Others	127	21.10%

### Pattern of psychiatric disorders

Most common disorders among the patients attending psychiatry OPD were Mood disorders 35.16%, Schizophrenia & other Psychoses 25.3%, Anxiety disorders 18.3%. The other common disorders were 21.10%.

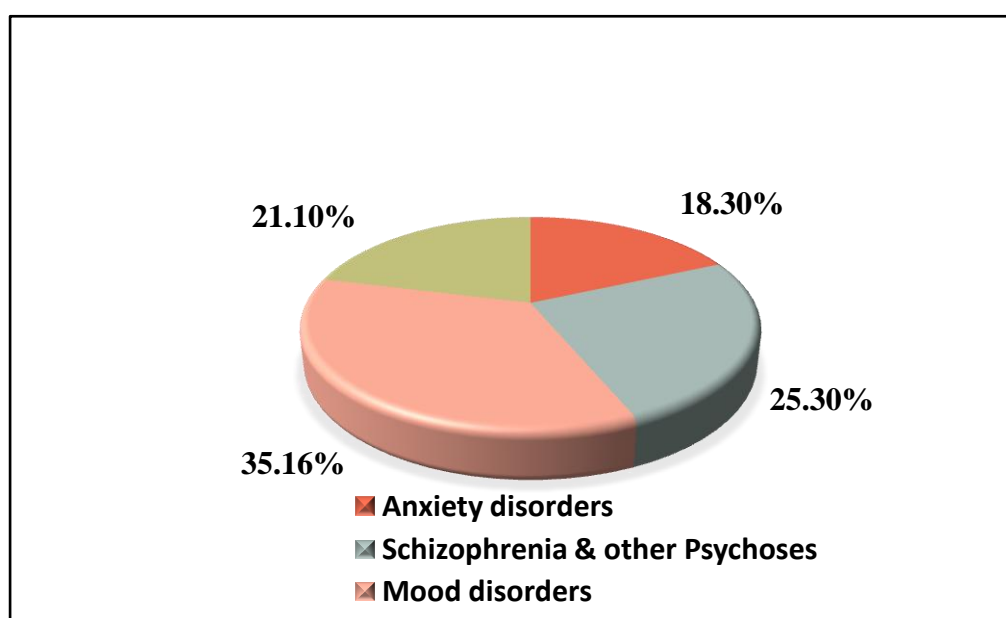


Figure-3: Pattern of psychiatric disorders

**Analysis of Prescription Patterns According to Various WHO/ INRUD Drug Use Indicators:** In present study, 600 prescriptions contained 1890 drugs, out of which psychotropic drugs were 1708, the prescriptions were assessed as per WHO/INRUD drug use indicators and reported. Drugs used in Mood disorders, Drugs used in Anxiety disorders, Drugs used in Schizophrenia and other psychoses.



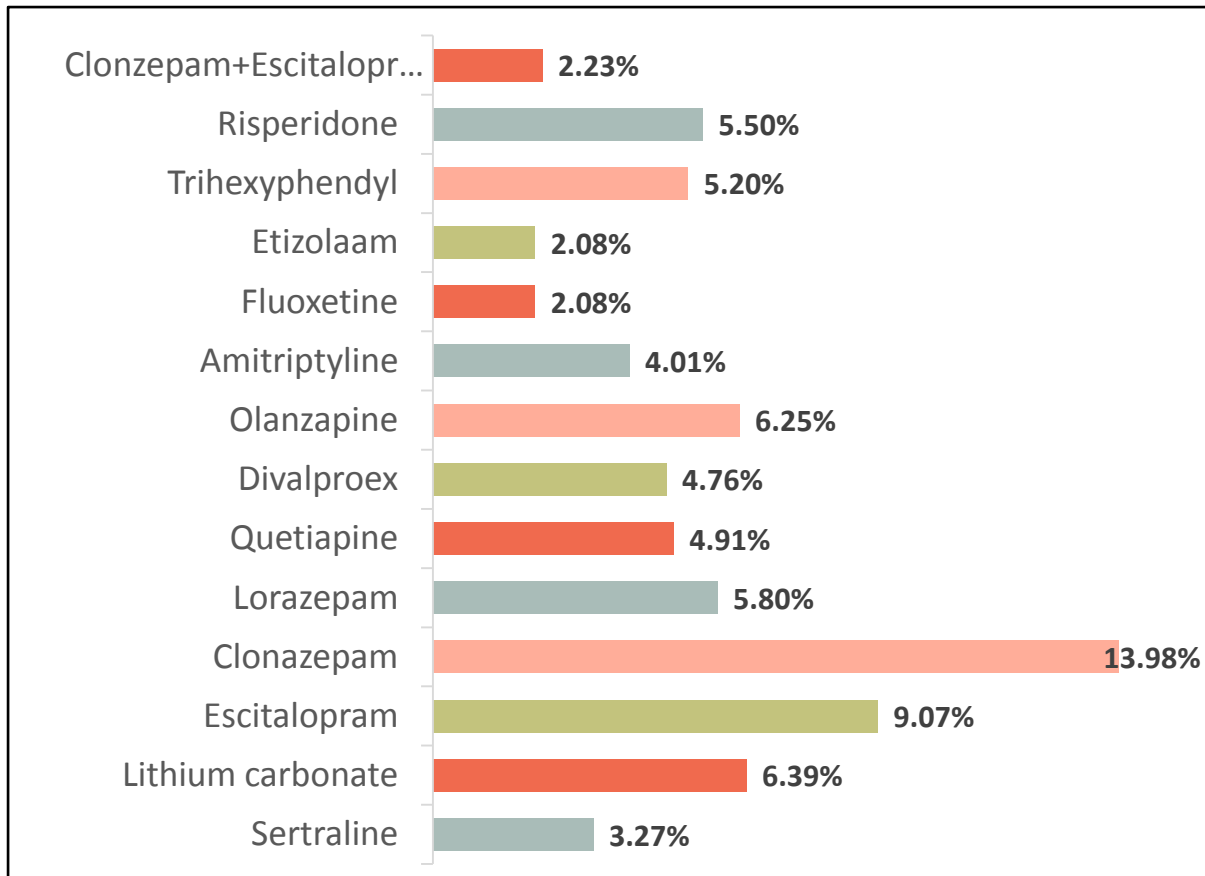
**Table 4: Assessment of the prescription pattern, as per various drug use indicators**

S.No	Drug Use Indicators	Results
1.	Average number of drugs per prescription	3.15
2.	Average number of psychotropic drugs per prescription	2.84
3.	Percentage of prescriptions containing psychotropic FDCs	126/600(21%)
4.	Percentage of prescriptions with an injection prescribed	41/600(6.83%)
5.	Percentage of prescriptions with psychotropic drugs prescribed from NLEM	249/600(41.5%)

### Drug Use Pattern in Mood Disorders

Among the drugs used in bipolar mood disorders, clonazepam (anxiolytic) was most commonly prescribed followed by escitalopram (SSRI antidepressant), lithium carbonate (mood stabilizer) and olanzapine (antipsychotic). Currently, SSRIs are greatly preferred over the other classes of antidepressants. The adverse-effect profile of SSRIs is less prominent than that of some other agents, which promotes better compliance<sup>(63,64)</sup>. Monoamine Oxidase Inhibitors (MAOI) were not prescribed to anyone in our study. The reasons being risk of hypertensive crisis, interactions with other drugs and dietary restrictions for patients on MAOIs agents, which promotes better compliance<sup>(62)</sup>. Lithium was used only in 6.3% patients of bipolar disorder. Studies have shown that patients with bipolar disorder have fewer episodes of mania and depression when treated with mood stabilizing drugs<sup>(66)</sup>.

According to the NICE guidelines – 2006<sup>(67)</sup>, for the management of bipolar disorder, lithium, olanzapine or valproate can be considered for long-term treatment. If the patient has frequent relapses, or symptoms that continued to cause functional impairment, switching to an alternative monotherapy or adding a second prophylactic agent (lithium or olanzapine or valproate) should be considered. If a trial of a combination of prophylactic agents proves ineffective, lamotrigine or carbamazepine can be tried.

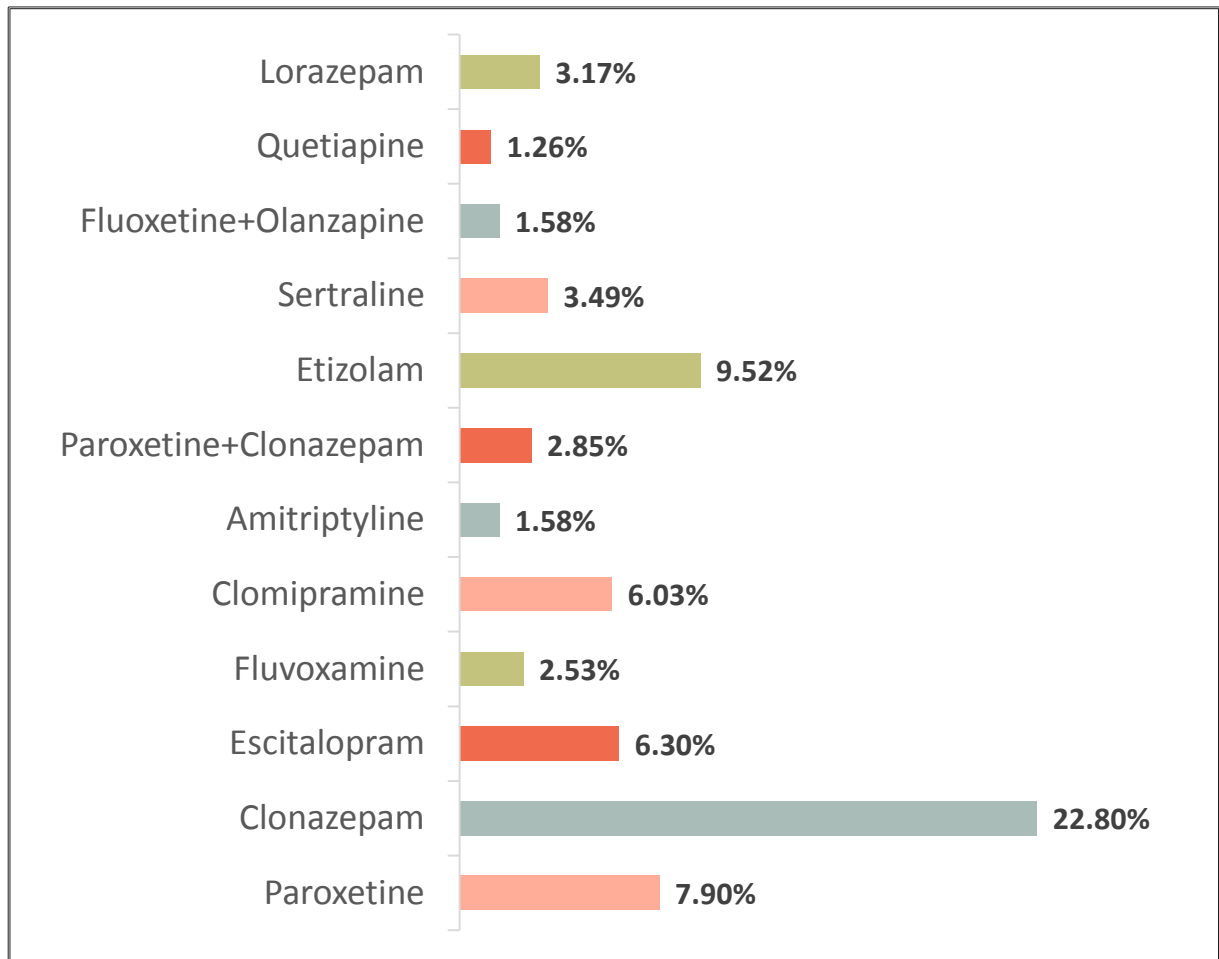


**Figure –4:Percent utilization of drugs in prescriptions of patients suffering from Mood disorders**

#### **Drug Use Pattern in Anxiety Disorders**

Clonazepam was the most commonly prescribed drug for anxiety disorders, followed by etizolam (benzodiazepine), paroxetine (SSRI antidepressant) and escitalopram.

2011 NICE guidelines for the management of anxiety disorders state that SSRIs or Serotonin Norepinephrine Reuptake inhibitors (SNRIs) should be offered to the patient first. Benzodiazepines should be avoided and used only for short term in case of crisis. Benzodiazepines can be reasonably used as an adjunct in the initial stage while SSRIs are titrated to an effective dose, and they can then be tapered over 4-12 weeks while the SSRI is continued.

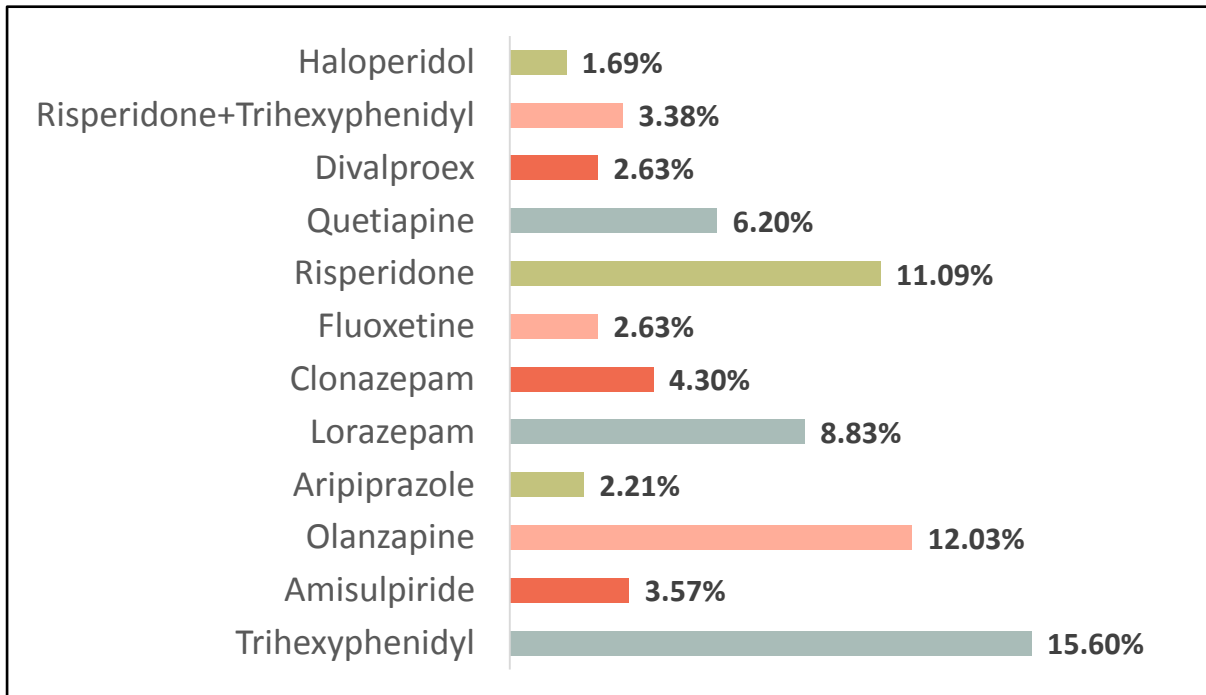


**Figure –5: Percent utilization of drugs in prescription of patients suffering from Anxiety disorders**

### **Drug Use Pattern in Schizophrenia**

The most commonly prescribed drugs were Trihexyphenidyl(anti-cholinergic) followed by olanzapine & risperidone (2<sup>nd</sup> generation antipsychotic). Trihexyphenidyl helps to reduce the extrapyramidal symptoms. According to American psychiatric association 2<sup>nd</sup> generation antipsychotics are the agents of choice for first line treatment of schizophrenia <sup>(62)</sup>. Combination of Trihexyphenidyl and Risperidone is also frequently prescribed. However, this represents an excess use of the anti-cholinergic drug Trihexyphenidyl. Most of the antipsychotic drugs (typical) themselves have mild anticholinergic effects. Anti-cholinergic

side effects can be debilitating like retention of urine, constipation, attack of angle closure glaucoma, dry mouth etc.



**Figure –6:Percent utilization of drugs in a prescription of patients suffering from Schizophrenia and other psychoses**

**Cost analysis of Psychiatric Drugs:**

In total, the prescription cost an average of 258.2, of which 238.2 (92.1%) were on psychotropic drugs. The hospitals bore 5% of the total cost of the prescription. The prescriptions were examined further in regard to their cost.

**Table 5:Cost analysis of Psychiatric Drugs**

S.no	Drugs	Dose per Tablet (mg)	frequency	Cost of 10 drugs as per hospital rate contract in (₹)	Average monthly cost (₹)	Price per 10 tabs/caps available in the market in (₹)		Average monthly Cost (₹)	
						Min (b)	Max (c)	Min	Max
1.	Acamprosate	333	OD	152	456	50	160	150	480
2.	Amisulpiride	50	BD	87.4	524.4	48	169	288	1014
		300	OD	332.5	997.5	208	386	625	1158

		400	OD	448.4	1345.2	261	627	783	1881
3.	Amitriptyline	10	OD	22	66	2.8	137	8.4	411
		25	OD	23	69	9	37	27	111
4.	Amoxapine	50	OD	11	33	39	53	117	159
5.	Aripiprazole	2	OD	84	252	41	478	123	1434
		5	OD	80	240	47	123	141	369
		10	OD	133	399	47	210	141	630
		15	OD	166.2	525	72	272.5	216	817.5
6.	Buspirone	5	BD	22.5	135	8.09	34	24.27	102
		10	OD	38	114	12.35	50.5	37.05	151.5
7.	Bupropion	150	OD	73	219	65	400	195	1200
8.	Carbamazepine	400	OD	49	147	24	77	72	231
9.	Chlordiazepoxide + trifluoperazine	1+10	OD	70	210	4.45	94	13.35	282
10.	Chlorpromazine	10	OD	1.6	4.8	1.63	2.29	4.89	6.87
11.	Citalopram	20	OD	49.4	148.2	38	113.7	114	341.2
12.	Clomipramine	25	OD	59	177	15.25	96.75	45.75	290.2
		75	OD	153	459	94	223	282	669
13.	Clonazepam	0.5	OD	32	96	9.9	45	29.7	135
		0.25	BD	19	144	9.1	80	27.3	240
14.	Clonazepam + escitalopram	0.5 + 10	OD	129	387	40.79	140	122.3	420
15.	Clozapine	25	OD	26.5	80	15.9	35	47.7	105
16.	Desvenlafaxine	50	OD	157	471	80	177	240	531
17.	Divalproex	250	BD	85	510	38	107	228	642
		500	BD	166	996	69	599	414	3594
		750	OD	185	556	107.5	210	322.5	630
		1000	OD	207	621	16.3	218	48.9	654
18.	Dosulepin	25	OD	50.4	151.2	23.27	77	69.81	231
19.	Escitalopram	5	OD	33.2	99.7	23.8	119	71.4	357
		10	OD	86	258	10	119	30	357
		15	BD	123.5	741	110	143.5	660	861
20.	Etizolam	0.5	BD	55	330	26	118	156	708
21.	Fluoxetine	20	OD	40	120	20.65	717	61.95	2151
		60	OD	103.6	310.8	35.5	110	106.5	330
22.	Fluoxetine + olanzapine	20 + 5	OD	66	198	39.03	83	117.1	249
23.	Fluvoxamine	50	BD	188	1128	94.1	236	564.6	1416
		100	OD	258.4	775.2	120	374	360	1122

24.	<b>Haloperidol</b>	0.25	OD	17.3	51.9	4.9	77.5	14.7	232.5
		10	OD	49	147	16.1	60.5	48.3	181.5
25.	<b>Lamotrigine</b>	50	OD	150	450	51	164	153	492
26.	<b>Lithium carbonate</b>	300	OD	16.3	48.9	7.25	28	21.75	84
		400	BD	55.2	331.2	14.45	145	86.7	870
27.	<b>Lorazepam</b>	1	TID	64.6	581.4	7.68	95	69.12	855
		2	BD	78	468	10.8	83	64.8	498
28.	<b>Mirtazapine</b>	7.5	OD	72.7	218	35	90	105	174
		15	OD	114	342	55	134	165	402
29.	<b>Naproxen domperidone</b> +	250+1 0	OD	60	180	38.16	99	114.4	297
30.	<b>Olanzapine</b>	2.5	OD	23.7	71.2	9.9	51	29.7	153
		5	OD	43	129	17.9	240	53.7	720
		7.5	OD	85.5	256.5	21.9	90	65.7	270
		10	OD	81	243	36	470	108	1410
		15	OD	147.3	442	60	163	180	489
31.	<b>Oxcarbazepine</b>	300	TID	112	672	44	141	264	846
32.	<b>Paroxetine</b>	10	OD	232	696	50	244	150	732
		12.5	OD	156	468	36	164	108	492
33.	<b>Paroxetine clonazepam</b> +	12.5 + 0.5	OD	151	453	90	225	270	675
34.	<b>Pimozide</b>	2	OD	57	171	11.5	90	34.5	270
35.	<b>Piracetam</b>	400	OD	62	186	25.4	85	76.2	255
36.	<b>Quetiapine</b>	25	OD	26	78	15.7	45	47.13	135
		50	OD	30.5	91	23.5	65	70.5	195
		100	OD	87.4	262	40	110	120	330
37.	<b>Risperidone</b>	1	BD	98	588	7.4	135	44.4	810
		2	OD	44.7	134.1	12.9	240	38.7	720
		3	OD	64.5	194	20.1	405	60.3	1215
		4	OD	76	228	29	540	87	1620
38.	<b>Risperidone trihexyphenidyl</b> +	4+2	OD	95	285	44	115.5	132	346.5
		3+2	OD	56	168	26.5	60	79.5	180
		2+2	OD	53.5	267.5	20	55	60	135
39.	<b>Sertraline</b>	25	OD	86.5	260	19	91	57	273
		50	BD	103.5	621.5	24	159	144	954
		100	BD	218	1308	45.25	400	271.5	2400
40.	<b>Sodium valproate</b>	500	OD	73	219	67	98	201	294
41.	<b>Tofisopam</b>	50	BD	141	564	145	287	580	1148
42.	<b>Topiramate</b>	50	BD	131	786	36	203	216	1218

43.	<b>Trifluoperazine</b>	10	TID	6.65	60	4.5	22.8	40.5	205
44.	<b>Trihexyphenidyl</b>	2	OD	19	57	6.64	33.5	19.92	100.5
45.	<b>Vilazodone</b>	20	OD	157.7	473	136	199	408	597
46.	<b>Zolpidem</b>	10	OD	135	405	26.67	142	80.01	426

## Conclusion

The most frequent diagnoses were mood disorders, followed by schizophrenia and anxiety disorders. Clonazepam and its fixed drug combination with escitalopram were the most frequently prescribed medications for those with mood disorders, whereas Etizolam and fluoxetine were the least frequently recommended medications. In Schizophrenia and other psychotic conditions the most commonly prescribed single drug and fixed drug combination were, Trihexyphenidyl and Risperidone+Trihexyphenidyl, respectively and the least commonly prescribed drug was Haloperidol. In Anxiety disorders conditions the most commonly prescribed single drug and fixed drug combination were, Clonazepam and Fluoxetine+Olanzapine, respectively and the least commonly prescribed drug was quetiapine. Overall, the rational prescribing principles were adhered to in accordance with the numerous drug usage indicators listed by WHO/INRUD. Due to socioeconomic factors, financial limitations, and technical challenges, several departures from the recommendations (APA and NICE) were discovered.

**Cost Analysis:** The cost of therapy is an important factor in various psychiatric disorders, because of the prolonged treatment. The cost of drugs prescribed was found that the minimum cost of drug therapy per month was 21.15 for Trifluoperazine and the maximum cost was 2505 for Naltrexone. The CI of Vilazodone was the lowest CI (1.04 times) and that of Amitriptyline was the highest (48.9 times). Cost Index (CI) provides an overview of the difference in price between drugs marketed by different companies. The purpose of this is to emphasize the necessity of prescribing generic medications and choosing brands that provide good quality at a reasonable price.

## References

- 1 World Health Organization. Improving access and use of psychotropic medicines-WHO mental health policy and service guidance package - module 10

- [https://www.who.int/mental\\_health/policy/services/essentialpackage1v10/en/](https://www.who.int/mental_health/policy/services/essentialpackage1v10/en/)
- 2 Murthy R. Mental Health Programme in the 11th five-year plan. *Indian J Medl Res.* 2007; 11:707-12.
  - 3 Sharma P, Das S, Deshpande S. An estimate of the monthly cost of two major mental disorders in an Indian metropolis. *Indian J Psychiatry.* 2006; 48:143-8.
  - 4 World Health Organization. The World Health Report 2001- Mental Health: New understanding, new hope. Geneva; 2001. Available from: <http://www.who.int/whr/2001/en/> (cited 2012 Sep 5).
  - 5 American Psychological Association <https://dictionary.apa.org/mental-disorder>
  - 6 Salik I, Marwaha R. StatPearls [Internet]. StatPearls Publishing; Treasure Island (FL): Nov 29, 2020. Electroconvulsive Therapy. [PubMed]
  - 7 Singh R, Volner K, Marlowe D. StatPearls [Internet]. StatPearls Publishing; Treasure Island (FL): Nov 15, 2020. Provider Burnout. [PubMed]
  - 8 Saracino RM, Nelson CJ. Identification and treatment of depressive disorders in older adults with cancer. *J GeriatrOncol.* 2019, 10(5):680-684. [PMC free article] [PubMed]
  - 9 Leonard K, Abramovitch A. Cognitive functions in young adults with generalized anxiety disorder. *Eur Psychiatry.* 2019 Feb; 56:1-7. [PubMed]
  - 10 Roomruangwong C, Simeonova DS, Stoyanov DS, Anderson G, Carvalho A, Maes M. Common Environmental Factors May Underpin the Comorbidity between Generalized Anxiety Disorder and Mood Disorders via Activated Nitro-oxidative Pathways. *Curr Top Med Chem.* 2018; 18(19):1621-1640. [PubMed]
  - 11 Grenier S, Desjardins F, Raymond B, Payette MC, Rioux MÈ, Landreville P, Gosselin P, Richer MJ, Gunther B, Fournel M, Vasiliadis HM. Six-month prevalence and correlates of generalized anxiety disorder among primary care patients aged 70 years and above: Results from the ESA-services study. *Int J Geriatr Psychiatry.* 2019 Feb; 34(2):315-323. [PubMed]
  - 12 Silva MT, CaicedoRoa M, Martins SS, da Silva ATC, Galvao TF. Generalized anxiety disorder and associated factors in adults in the Amazon, Brazil: A population-based study. *J Affect Disord.* 2018 Aug 15; 236:180-186. [PubMed]
  - 13 Scheeringa MS, Burns LC. Generalized Anxiety Disorder in Very Young Children: First Case Reports on Stability and Developmental Considerations. *Case Rep Psychiatry.* 2018; 2018:7093178. [PMC free article] [PubMed]



- 14 Ströhle A, Gensichen J, Domschke K. The Diagnosis and Treatment of Anxiety Disorders. *DtschArztebl Int.* 2018 Sep 14; 155(37):611-620. [PMC free article] [PubMed]
- 15 Latas M, Trajković G, Bonevski D, Naumovska A, Vučinić Latas D, Bukumirić Z, Starčević V. Psychiatrists' treatment preferences for generalized anxiety disorder. *Hum Psychopharmacol.* 2018 Jan;33(1) [PubMed]
- 16 Driot D, Bismuth M, Maurel A, Soulie-Albouy J, Birebent J, Oustric S, Dupouy J. Management of first depression or generalized anxiety disorder episode in adults in primary care: A systematic metareview. *Presse Med.* 2017 Dec;46(12 Pt 1):1124-1138. [PubMed]
- 17 Roberge P, Normand-Lauzière F, Raymond I, Luc M, Tanguay-Bernard MM, Duhoux A, Bocti C, Fournier L. Generalized anxiety disorder in primary care: mental health services use and treatment adequacy. *BMC FAMPract.* 2015 Oct 22; 16:146. [PMC free article] [PubMed]
- 18 Patel KR, Cherian J, Gohil K, Atkinson D. Schizophrenia: overview and treatment options. *P T.* 2014 Sep; 39(9):638-45. [PMC free article] [PubMed]
- 19 Kirkbride JB, Errazuriz A, Croudace TJ, Morgan C, Jackson D, Boydell J, Murray RM, Jones PB. Incidence of schizophrenia and other psychoses in England, 1950-2009: a systematic review and meta-analyses. *PLoS One.* 2012;7(3):e31660. [PMC free article] [PubMed]
- 20 Grande I, Berk M, Birmaher B, Vieta E. Bipolar disorder. *Lancet.* 2016 Apr 09;387(10027):1561-1572. [PubMed]
- 21 Blanco C, Compton WM, Saha TD, Goldstein BI, Ruan WJ, Huang B, Grant BF. Epidemiology of DSM-5 bipolar I disorder: Results from the National Epidemiologic Survey on Alcohol and Related Conditions - III. *J Psychiatr Res.* 2017 Jan; 84:310-317. [PMC free article] [PubMed]
- 22 Miklowitz DJ, Johnson SL. The psychopathology and treatment of bipolar disorder. *Annu Rev Clin Psychol.* 2006; 2:199-235. [PMC free article] [PubMed]
- 23 McGuffin P, Rijsdijk F, Andrew M, Sham P, Katz R, Cardno A. The heritability of bipolar affective disorder and the genetic relationship to unipolar depression. *Arch Gen Psychiatry.* 2003 May;60(5):497-502. [PubMed]
- 24 Manji HK, Quiroz JA, Payne JL, Singh J, Lopes BP, Viegas JS, Zarate CA. The underlying neurobiology of bipolar disorder. *World Psychiatry.* 2003 Oct;2(3):136-

46. [PMC free article] [PubMed]
- 25Bebbington P, Ramana R. The epidemiology of bipolar affective disorder. *Soc Psychiatry PsychiatrEpidemiol.* 1995 Nov; 30(6):279-92. [PubMed]
- 26Pini S, de Queiroz V, Pagnin D, Pezawas L, Angst J, Cassano GB, Wittchen HU. Prevalence and burden of bipolar disorders in European countries. *EurNeuropsychopharmacol.* 2005 Aug; 15(4):425-34. [PubMed]
- 27Merikangas KR, Jin R, He JP, Kessler RC, Lee S, Sampson NA, Viana MC, Andrade LH, Hu C, Karam EG, Ladea M, Medina-Mora ME, Ono Y, Posada-Villa J, Sagar R, Wells JE, Zarkov Z. Prevalence and correlates of bipolar spectrum disorder in the world mental health survey initiative. *Arch Gen Psychiatry.* 2011 Mar; 68(3):241-51. [PMC free article] [PubMed]
- 28Tsuchiya KJ, Byrne M, Mortensen PB. Risk factors in relation to an emergence of bipolar disorder: a systematic review. *Bipolar Disord.* 2003 Aug;5(4):231-42. [PubMed]
- 29McIntyre RS, Konarski JZ, Soczynska JK, Wilkins K, Panjwani G, Bouffard B, Bottas A, Kennedy SH. Medical comorbidity in bipolar disorder: implications for functional outcomes and health service utilization. *Psychiatr Serv.* 2006 Aug; 57(8):1140-4. [PubMed]
- 30Grande I, Fries GR, Kunz M, Kapczinski F. The role of BDNF as a mediator of neuroplasticity in bipolar disorder. *Psychiatry Investig.* 2010 Dec; 7(4):243-50. [PMC free article] [PubMed]
- 31Krebs G, Heyman I. Obsessive-compulsive disorder in children and adolescents. *Arch Dis Child.* 2015 May; 100(5):495-9. [PMC free article] [PubMed]
- 32Veale D, Roberts A. Obsessive-compulsive disorder. *BMJ.* 2014 Apr 07; 348:g2183. [PubMed]
- 33Goodman WK, Grice DE, Lapidus KA, Coffey BJ. Obsessive-compulsive disorder. *PsychiatrClin North Am.* 2014 Sep; 37(3):257-67. [PubMed]
- 34Fenske JN, Schwenk TL. Obsessive compulsive disorder: diagnosis and management. *Am FAM Physician.* 2009 Aug 01; 80(3):239-45. [PubMed]
- 35Fenske JN, Petersen K. Obsessive-Compulsive Disorder: Diagnosis and Management. *Am FAM Physician.* 2015 Nov 15; 92(10):896-903. [PubMed]
- 36Nakao T, Okada K, Kanba S. Neurobiological model of obsessive-compulsive disorder: evidence from recent neuropsychological and neuroimaging findings. *Psychiatry*

- ClinNeurosci. 2014 Aug; 68(8):587-605. [PubMed]
- 37Sheshachala K, Narayanaswamy JC. Glutamatergic augmentation strategies in obsessive-compulsive disorder. Indian J Psychiatry. 2019 Jan; 61(Suppl 1):S58-S65. [PMC free article] [PubMed]
- 38Bhikram T, Abi-Jaoude E, Sandor P. OCD: obsessive-compulsive ... disgust? The role of disgust in obsessive-compulsive disorder. J Psychiatry Neurosci. 2017 Sep; 42(5):300-306. [PMC free article] [PubMed]
- 39Tripathi, K. D. (2018). Essentials of medical pharmacology (8th ed.). Jaypee Brothers Medical.
- 40Mayo Clinic Staff. (2019). Selective serotonin reuptake inhibitors (SSRIs). [mayoclinic.org/diseases-conditions/depression/in-depth/ssris/art-20044825](http://mayoclinic.org/diseases-conditions/depression/in-depth/ssris/art-20044825)
- 41Haddad PM, et al. (2018). The acute efficacy of antipsychotics in schizophrenia: A review of recent meta-analyses. DOI: 10.1177/2045125318781475
- 42Murray R, et al. (2017). Atypical antipsychotics: Recent research findings and applications to clinical practice: Proceedings of a symposium presented at the 29th Annual European College of Neuropsychopharmacology Congress, 19 September 2016, Vienna, Austria. DOI: 10.1177/2045125317693200
- 43WHO International Working Group for Drug Statistics Methodology. Introduction to drug utilization research [Internet]. Geneva: WHO Collaborating Centre for Drug Utilization Research and Clinical Pharmacology; 2003 [cited 2012 Nov 1]. Available from: [http://www.whocc.no/filearchive/publications/drug\\_utilization\\_research.pdf](http://www.whocc.no/filearchive/publications/drug_utilization_research.pdf).
- 44A Text Book of Clinical Pharmacy Practice: Essential Concepts and Skills G Parthasarathi, K Nyfort-Hansen, M C Nahata, 2012
- 45Drug Utilization Review Strategies R P Navarro, Managed Care Pharmacy Practice. Jones & Bartlett Learning: 215-229, 2008
- 46Guidelines for implementing drug utilization review programs in hospital M Thomas, B Alexander, S Tony, Z Andrei, 1-56, 1997
- 47Gupta N, Sharma D, Garg SK, Bhargava VK. Auditing of prescriptions to study utilization of antimicrobials in tertiary hospital. Indian J Pharmacol. 1997;29(6):411-5
- 48Introduction to Drug Utilization Research by World Health Organization. Available

- from: [http://www.whooc.no/filearchive/publications/drug\\_utilization\\_research.pdf](http://www.whooc.no/filearchive/publications/drug_utilization_research.pdf).  
[Last accessed on 2014 Mar 12].
- 49Rode S, Salankar H, Verma P. Pharmacoepidemiological survey of schizophrenia in Central India. *Int J Res Med Sci*. 2014; 2(3):1058- 62.
- 50Strom BL: Pharmacoepidemiology. John Wiley and Sons, Fourth Edition 2005
- 51Brunton L, Lazo J, and Parker K: Goodman & Gilman's the pharmacological basis of therapeutics. McGraw-Hill publication, Eleventh Edition 2006
- 52Martin K, Begaud B, Latry P, Miremont-Salame G, Fourrier A and Moore N: Differences between clinical trials and postmarketing use. *Br J ClinPharmacol* 2004; 57:86-92.
- 53World Health Organization. How to investigate drug use in health facilities: selected health use indicators [Internet]. WHO/ DAP/ 93. Geneva; 1993 [cited 2012 Sep 5]. p. 1–87. Available from: <apps.who.int/medicinedocs/en/d/Js2289e/4.4.html>
- 54Rode SB, Ajagallay RK, Salankar HV, Sinha U. A study on drug prescribing pattern in psychiatry out-patient department from a tertiary care teaching hospital. *Int J Basic ClinPharmacol* 2014; 3:517-22.
- 55Mudhaliar MR, Ishrar SMG, Sadubugga P, Narala SR, Chinnakotla V, Yendluri P. Psychotropic drug utilization in psychiatric outpatient department of a tertiary care teaching hospital in India. *Int J Res Med Sci* 2017;5:1612-6
- 56Ramanand SJ, Khot PV, Ramanand JB, Gaidhankar SL. A drug utilization study of psychotropic drugs in indoor patients of psychiatry department in a tertiary care hospital. *Ann Indian Psychiatry* [serial online] 2020 [cited 2021 May 20]; 4:175-80. Available from: <https://www.anip.co.in/text.asp?2020/4/2/175/301430>
- 57R., B., S. M., A. K. M., and N. P. “An Observational Study of Drug Utilization Pattern and Pharmacovigilance of Antipsychotics”. *International Journal of Current Pharmaceutical Research*, Vol. 9, no. 6, Nov. 2017, pp. 56-62, doi:10.22159/ijcpr.2017v9i6.23430
- 58Patel KR, Cherian J, Gohil K, Atkinson D. Schizophrenia: overview and treatment options. *P T*. 2014 Sep; 39(9):638-45. PMID: 25210417; PMCID: PMC4159061.
- 59Potter W, Hollester L. Antidepressant Agents. in: Katzung B, editor. *Basic and Clinical Pharmacology*. 10th ed. Boston: McGraw-Hill; 2007. p. 475–88.
- 60Research Center for Drug Evaluation and Drug Safety and Availability - FDA Drug

- Safety Communication. Revised recommendations for Celexa (citalopram hydrobromide) related to a potential risk of abnormal heart rhythms with high doses [Internet]. Center for Drug Evaluation and Research; 2011 [cited 2012 Nov 3]. Available from: <http://www.fda.gov/Drugs/DrugSafety/ucm297391.html>.
- 61 Balon R, Mufti R, Arfken CL. A survey of prescribing practices for monoamine oxidase inhibitors. *Psychiatric services (Washington, D.C.)* [Internet]. 1999 Jul [cited 2012 Nov 3]; 50(7):945–7. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/10402617>
- 62 Kessing LV, Hellmund G, Geddes JR, Goodwin GM, Andersen PK. Valproate v. lithium in the treatment of bipolar disorder in clinical practice: observational nationwide register-based cohort study. *The British journal of psychiatry: the journal of mental science* [Internet]. 2011 Jul [cited 2012 Nov 3]; 199(1):57–63. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/21593515>.
- 63 NICE. Bipolar disorder (CG38) [Internet]. National Collaborating Centre for Mental Health; 2006 [cited 2012 Nov 3]. p. National Institute for Health and Clinical Excellence. Available from: <http://www.nice.org.uk/CG38>.
- 64 Davis KL, Charney D, Coyle JT, Nemeroff C, editors. *Neuropsychopharmacology: The Fifth Generation of Progress* [Internet]. Philadelphia, Pennsylvania: Lippincott, Williams, & Wilkins; 2002. Available from: <http://www.acnp.org/g4/gn401000143/CH140.html>.
- 65 NICE. Anxiety (CG22) [Internet]. National Institute for Health and Clinical Excellence. National Collaborating Centre for Mental Health; 2011 [cited 2012 Nov 3]. Available from: <http://guidance.nice.org.uk/CG113>.
- 66 Yates W. Anxiety Disorders Treatment & Management [Internet]. Medscape Reference: Drugs, Diseases & Procedures. 2012 [cited 2012 Sep 3]. Available from: <http://emedicine.medscape.com/article/286227-treatment#aw2aab6b6b4>