Research Article

Study on assessment of prescribing pattern and cost of anti-craving medication in alcohol dependent patients from rural areas

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ABSTRACT

OBJECTIVE: Alcohol dependence is one of the major chronic disorder with high mortality and morbidity in the today's world, with a relapsing and remitting course. The main objective of the present study was to assess the prescribing pattern and cost of anticraving medications in alcohol dependent patients from rural areas. **Materials and Methods:** A prospective observational study was carried out for 110 patients for a period of six months in an in-patient Psychiatry department of a 950 bedded tertiary care teaching hospital in Bangalore. Patients satisfying inclusion criteria were enrolled after obtaining Informed consent. Patient's data entered into case report form (CRF). Medication orders were observed for drug utilization Pattern. Patients who have been diagnosed with alcohol dependence syndrome as per ICD 10 diagnostic criteria were included, noted down the prescription components and prescriptions analyzed as per "Clinical practice guidelines for the treatment of alcohol dependence. **Result & discussion:** A total number of 110 prescription were analyzed during the six month study period from which 108(98.19%) were found to be male diagnosed with ADS. The range of all inpatient was from 20 to 60 years. Of these, 36-55 years of age group was in majority with 80 number of patients.47(42.73%) patients diagnosed with ADS and 63(57.27%) diagnosed with ADS with other complication. 10(9.09%) patients found very severe, 69(62.73%) patients were found with high level severity and 31(28.18%) patients were found medium level severity measured by the AUDIT SCALE. 29(35.45%) patients were found with mild alcohol withdrawal symptoms, 61(55.45%) were found with moderate withdrawal symptoms and 10 (9.09%) were found with sever withdrawal symptoms measured with CIW-Ar Scale. 3(2.73%) patients were low dependence to alcohol, 13(11.82%) patient were medium dependence to alcohol , 94(85.45%) patients were high dependence. 103(93.64%) patients were prescribed with Baclofen ,5 (4.55%) patients were prescribed with Acomprosate, 2(1.82%) patients were prescribe with Naltraxone are Anticraving drugs. A total 10 number of other classes of drug were prescribed along with Anti-craving drug like PPI 14(12.72%), Benzodiazepine 110(100%), Multi-vitamins 110(100%), Anti-psychotic 110(100%), Anti-hypertensive 2(1.82%), Anti-diabetic 1(0.91%), Anti-emetic 9(8.12%), NSAID 5(4.55%), Anti-biotic 4(3.64%), Anticonvulsant 5(4.55%). 1-5 number of drugs prescribe in 69(62.72%) number of prescription , 6-10 number of drugs prescribed in 23(20.90%) number of prescription , >10 number of drugs prescribed in 18(16.32%). Baclofen per prescription 10 tablets cost were found INR 194, acomprosate per prescription 10 tablets cost were found INR 57, naltrexone per prescription 10 tablets cost were found INR 350. **Conclusion:** among anti-craving drugs prescribed for treating the ADS patients with or without other complications, most of the cases were found to be prescribed with baclofen and majority of patients suffering with only ADS with no other co-morbidity. male patients were more than female patients all the anticraving drugs were prescribing in generic name. More than 4 medication per prescription indicate ADS with other complication required more attention. 100% usage of benzodiazepine, anti-psychotic and multi-vitamins indicates that these medications were required to treat the other complication in ADS patients.

Keywords: Alcohol dependence syndrome, prescribing, anti craving medications, cost analysis.

INTRODUCTION:

Alcohol dependence is a chronic disorder, with a relapsing and remitting course like other chronic diseases, such as diabetes and hypertension. The major challenge in the treatment of alcoholism is the prevention of relapse to heavy drinking [1].

The Tenth Revision of the International Classification of Diseases and Health Problems (ICD-10) defines the dependence syndrome as being a cluster of physiological, behavioural, and cognitive phenomena in which the use of a substance or a class of substances takes on a much higher priority for a given individual than other behaviours that once had greater value [2]

Alcohol is present in a variety of popular beverages [3]:

Beverage	% Alcohol
Beer	3-6%
Wine	11-20%
Brandy	40%
Gin, scotch, vodka	40-50%

Disease conditions related to alcohol have been grouped into three broad categories, defined by the nature of the disease and the involvement of alcohol in their etiology:

Wholly attributable to alcohol (by definition) – e.g., Alcohol use disorders, Alcoholic fatty liver and cirrhosis, Ethanol toxicity;

Chronic conditions where a significant relationship with alcohol as a contributing cause has been found – e.g., Cancers of the mouth and throat, Breast cancer, Ischemic stroke;
Acute conditions where alcohol is a contributing cause – e.g., Road traffic crashes, Drowning [3].
Safe limits for chronic consumption of alcohol by gender:

For men not more than 21 units per week (and not more than 4 units in any 1 day), and for women 14 units per week (and not more than 3 units in any 1 day). Consistent drinking of more than these amounts carries a progressive risk to health [4].

Alcohol Dependence Syndrome (ADS) is one of the most common psychiatric illnesses seen in hospitals and causes serious morbidity and mortality. Heavy alcohol use directly affects brain function and alters various brain chemicals (examples, neurotransmitters) and hormonal systems [5].

Alcohol dependence is a complex disorder with environmental, drug induce and genetic components with the multiple gene probably contributing to vulnerability to the condition [6]. Alcoholism is differentiated from abuse by the presence of craving, tolerance and physical dependence, which result in behavioural changes and loss of control over drinking [7].
According to WHO estimates, about 2·5 million people worldwide are killed by alcohol every year [8].

ICD-10 Diagnostic guidelines

A definite diagnosis of dependence should usually be made only if three or more of the following have been present together at some time during the previous year:
➢ A strong desire or sense of compulsion to take the substance;
➢ Difficulties in controlling substance-taking behaviour in terms of its onset, termination, or levels of use;
➢ A physiological withdrawal state when substance use has ceased or have been reduced, as evidenced by: the characteristic withdrawal syndrome for the substance; or use of the same (or closely related) substance with the intention of relieving or avoiding withdrawal symptoms;
➢ Evidence of tolerance, such that increased doses of the psychoactive substance are required in order to achieve effects originally produced by lower doses (clear examples of this are found in alcohol- and opiate-dependent individuals who may take daily doses sufficient to incapacitate or kill non tolerant users);
➢ Progressive neglect of alternative pleasures or interests because of psychoactive substance use, increased amount of time necessary to obtain or take the substance or to recover from its effects;
➢ Persisting with substance use despite clear evidence of overtly harmful consequences, such as harm to the liver through excessive drinking, depressive mood states consequent to periods of heavy substance use, or drug-related impairment of cognitive functioning; efforts should be made to determine that the user was actually, or could be expected to be, aware of the nature and extent of the harm.[9]

Alcohol Use Disorders Identification Test (AUDIT), been developed by the World Health

Organization as a simple screening tool to pick up the early signs of hazardous and harmful drinking and identify mild dependence [10].

Additionally, comparison of social costs of alcohol in selected countries showed the net effect of alcohol consumption on health is detrimental, with an estimated 3·8% of all global deaths and 4·6% of global disability-adjusted life-years attributable to alcohol. Disease burden is closely related to average volume of alcohol consumption, and, for every unit of exposure, is strongest in poor people and in those who are marginalised from society. The costs associated with alcohol amount to more than 1% of the gross national product in high-income and middle-income countries, with the costs of social harm constituting a major proportion in addition to health costs. Overall, we conclude that alcohol consumption is one of the major avoidable risk factors, and actions to reduce burden and costs associated with alcohol should be urgently increased [11].

MATERIALS & METHODS

4.1 STUDY DESIGN: prospective observational study

4.2 STUDY PERIOD: 6 months

4.3 STUDY POPULATION: patients with alcohol dependence syndrome receiving anti-craving drug

4.3 a Inclusion criteria: Patient of either sex who are aged between 20 to 60 years. Patient who are diagnosed as suffering from alcohol dependence syndrome using as per ICD 10 diagnostic criteria.

4.3 b Exclusion criteria: The alcohol dependence syndrome patients who are not cooperative, not given informed consent , pregnant alcoholic patients, alcohol dependent patient with other drug abuse since 6 months and those who were unwilling to participate in the study.

4.4 STUDY SITE: Department of Psychiatric in MVJ Medical College and Research Hospital, Hoskote, Bangalore, South India. This Hospital is unique and well known for its services to the people from various parts of the city. The institution excels in diverse specialities like Medicine, Paediatrics, Dermatology, Psychiatry, Respiratory medicine, Surgery, Orthopaedics, Obstetrics and Gynaecology(OBG), Ophthalmology, Ear Nose Throat(ENT), Anaesthetics. The Hospital is well equipped with super specialities like Urology, Plastic Surgery, Faciomaxillary Surgery, Cardiology and Endocrinology.

4.5 HUMAN ETHICAL APPROVAL: Human Ethical Clearance (Central Research/MVJ MC& RH/01/2016) (Annexure I) was obtained from Ethical Committee of the study Hospital.

4.6 CASE RECORD FORM: A separate data entry format for incorporating patients details such as Name, Age, Gender, IP Number, Date of admission(DOA), Past medical and medication history, History of Alcohol consumption (Annexure IV), Audit score(Annexure V), CIWA-AR score(Annexure VI), SADD score (Annexure VII).

4.7 STUDY METHOD: The study was conducted in inpatients who were admitted in the psychiatry department of 950- bed multispecialty tertiary care teaching hospital located in Hoskote, Bangalore. All patients admitted in the psychiatry department diagnosed with alcohol dependent syndrome were observed. Patients satisfying the Study Inclusion Criteria were enrolled after taking Informed Consent (IC) (Annexure III). A thorough review of patient's medication charts was done to understand the prescription pattern and cost analysis for anti-craving drugs.
The information such as demographic, medication and clinical data is collected and documented in specially prepared patient data collection form.

The prescribing pattern and cost of anti craving medications in Alcohol dependent patients is assessed based on drug class, frequency, duration of use.

The prescribing pattern of anti craving medications is compared with the standard prescribing guidelines (clinical practice guidelines for treatment of Alcohol dependence).

4.8 ANALYSIS OF DATA: The collected data will be analyzed using descriptive statistics. Results will be depicted in the form of percentage, graph.

RESULT

A prospective observational study was carried out during the study period (six months) in psychiatry department ward of a tertiary care hospital.. 60-70 patients come to the hospital daily. 8-10 new patients are enrolled daily as inpatient into the psychiatry ward. A total number of 110 prescriptions from 110 patients were observed and the following evaluations were made from the observed data. Alcohol dependence patients were diagnosed based on the (ICD-10 criteria) guidelines.

5.1 Demographic Data of Study Patients:

Among 110 prescriptions, from which (98.19%) were found to be male. The range of age of all inpatients was from 20 to 60 years. Of these, 36-55 years of age group was in majority numbers 80 patients among others age group. The details are mentions in (Table. 5.1)

Table 5.1: DEMOGRAPHIC DATA OF STUDY POPULATION

Particulars	Number (%)
Total number of enrolled patients	110
Number of male patients	108 (98.19%)
Number of female patients	2 (1.82%)
Age range	
Number of young adult patients (18-35 years)	27 (24.55%)
Number of middle aged adult patients (36-55 years)	80 (72.73%)
Number of older adult patients (>55 years)	3 (2.73%)
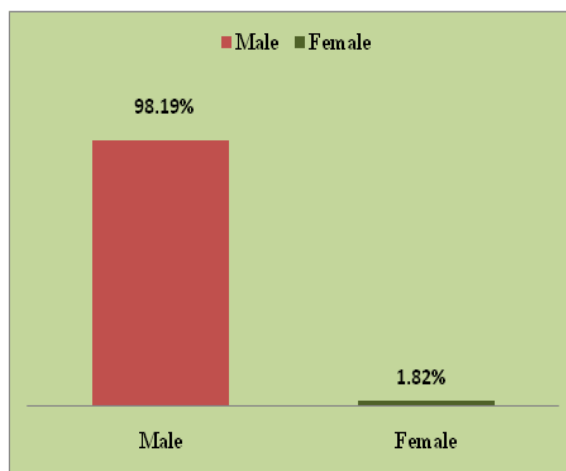
Figure 5.1: % OF PATIENTS SUFFERING WITH ADS

5.2 ADS PATIENTS DISTRIBUTED WITH OTHER COMPLICATIONS:

Out of 110 prescriptions, from the psychiatry department, the diagnosis group such as pure ADS were found to be 47 (42.73%) and ADS with other complications were found to be 63(57.27%).

**Table 5.2: ADS PATIENTS DISTRIBUTED WITH OTHER COMPLICATIONS**

ADS with other complications	Number of patients (%)
ADS	47 (42.73%)
ADS with Seizures	2 (1.82%)
ADS with schizophrenia	2 (1.82%)
ADS in withdrawal complicated	6 (5.45%)
ADS in withdrawal uncomplicated	25 (22.73%)
ADS with hypertension	2 (1.82%)
ADS with DM2	1 (0.91%)
ADS with fatty liver	2 (1.82%)
ADS with ALD	3 (2.73%)
ADS with intoxicated	3 (2.73%)
ADS with Alcohol induce psychosis	6 (5.45%)
ADS with Alcohol Gastritis	2 (1.82%)
ADS with Alcohol induce Nephropathy	1 (0.91%)
ADS in withdrawal complicated convulsion	4 (3.64%)
ADS in withdrawal state impetigo Delirium Uncomplicated state	1 (0.91%)
ADS with Alcohol induce Mood Disorder	1 (0.91%)
ADS with Hepatitis	1 (0.91%)

5.3 PATIENT DISTRIBUTION BASED ON SEVERITY

Out of 110 prescriptions from psychiatry department diagnosed with ADS, 10 (9.09%) patients were found very severe, 69 (62.73%) patients were found with high level severe and 31 (28.18%) patients were found medium level severe.

Table 5.3: DETERMINED THE SEVERITY LEVEL OF THE ADS PATIENTS

| AUDIT Score	Number of patients (%)
Between 8 and 15(medium level)	31 (28.18%)
Between 16 and 19(high level)	69 (62.73%)
20 or Above(severe level)	10 (9.09%)
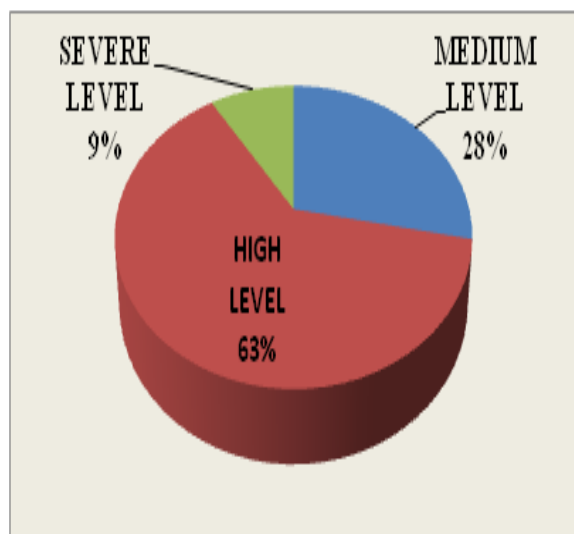
Figure 5.2: PATIENT DISTRIBUTED BASED ON SEVERITY

5.4 PATIENT DISTRIBUTION BASED ON WITHDRAWAL SYMPTOMS.

Out of 110 patients, from which 39 (35.45%) were found with mild alcohol withdrawal, 61 (55.45%) were found with moderate withdrawal and 10 (9.09%) were found with sever withdrawal as per CIW-Ar scale.

Table 5.4: PATIENT DISTRIBUTION BASED ON WITHDRAWAL SYMPTOMS

| CIWA Scale	Number of patients (%)
Mild alcohol withdrawal (<=15)	39 (35.45%)
Moderate alcohol withdrawal (16 to 20)	61 (55.45%)
Severe alcohol withdrawal (>20)	10 (9.09%)
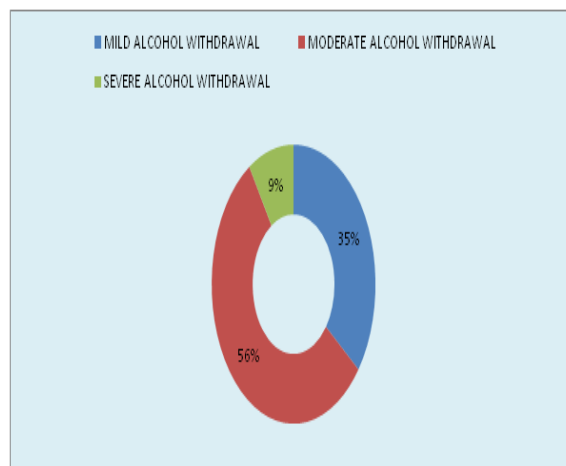
Figure 5.3: PATIENTS DISTRIBUTED BASED ON WITHDRAWAL SYMPTOMS

5.5 PATIENTS DISTRIBUTION BASED ON SADD SCALE

Out of 110 prescriptions, from the psychiatric patients diagnosed with ADS were having (2.73%) Low dependence, (11.81%) medium dependence, and (85.45%) High dependence.

Table 5.5: SADD SCORE OF STUDY POPULATION

Particulars	Numbers (%)
Low Dependence(1 to 9)	3 (2.73%)
Medium Dependence(10 to 19)	13 (11.82%)
High Dependence(>20)	94 (85.45%)
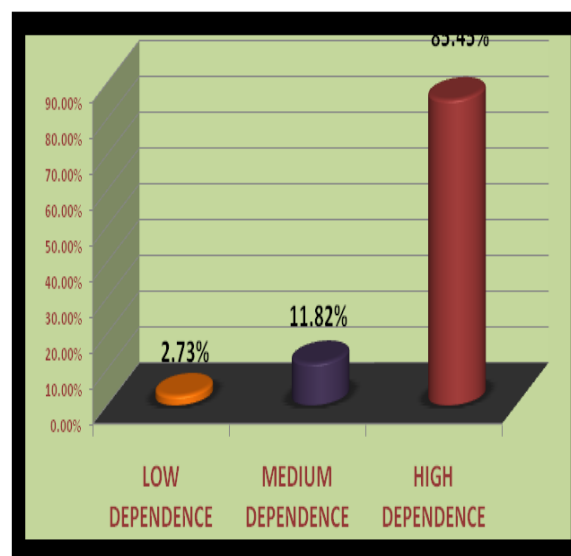
Figure 5.4: SADD SCORE OF STUDY POPULATION

5.6 NUMBER OF PRESCRIBED ANTI-CRAVING DRUG DISTRIBUTION

Out of 110 prescription of ADS patients from the psychiatric wards, (93.64%) Baclofen, (4.55%) Acomprostae, (1.82%) Naltraxone ,

Table 5.6: PATIENTS DISTRIBUTION BASED ON ANTI-CRAVING DRUGS

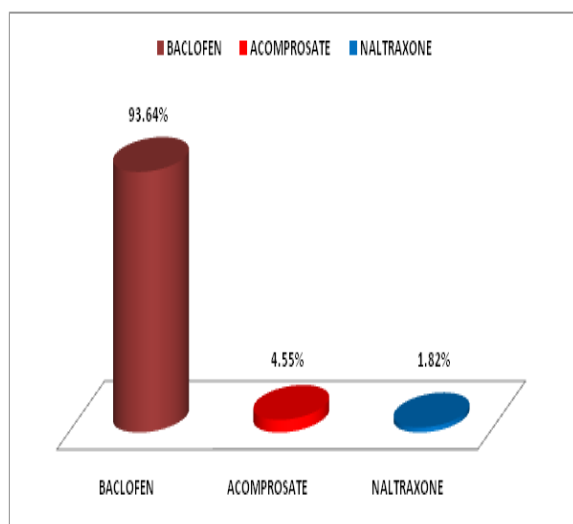| Anti-craving drug prescribed	Drug per prescription
Baclofen	103(93.64%)
Acomprosate	5(4.55%)
Naltraxone	2(1.82%)

Figure 5.5: PATIENT DISTRIBUTED BASED ON ANTI-CRAVING DRUGS

Table 5.7: Dosage form of Anti-craving drugs

Anti-Craving Drug	Dosage from	Dose
Baclofen	Tablet	20mg
Acomprosate	Tablet	333mg
Naltraxone	Tablet	35mg

5.7 NUMBER OF OTHER CLASS OF DRUG DISTRIBUTION

Out of 110 prescription of ADS patients from psychiatric department, mostly used class of drug were Benzodiazepine (Tablet Librium) .

Table 5.8: NUMBER OF OTHER CLASS OF DRUG DISTRIBUTION

Other class of drugs	Number of patients
Proton pump inhibitor	14(12.72%)
Benzodiazepine	110(100%)
Multi-vitamin	110(100%)
Anti-psychotic	110(100%)
Anti-hypertensive	2(1.82%)
Anti-diabetic	1(0.91%)
Anti-emetic	9(8.12%)
NSAID	5(4.55%)
Anti-biotic	4(3.64%)
Anticonvulsant	5(4.55%)

5.8 DRUG DISTRIBUTION OF ANTI-CRAVING BASED ON GENERIC NAME AND BRAND NAME

Out of 110 prescriptions of ADS patients in the psychiatric ward, all the Anti-Craving drugs has been prescribed in the generic name (100%) non of the Anti-craving drugs prescribed in brand name .
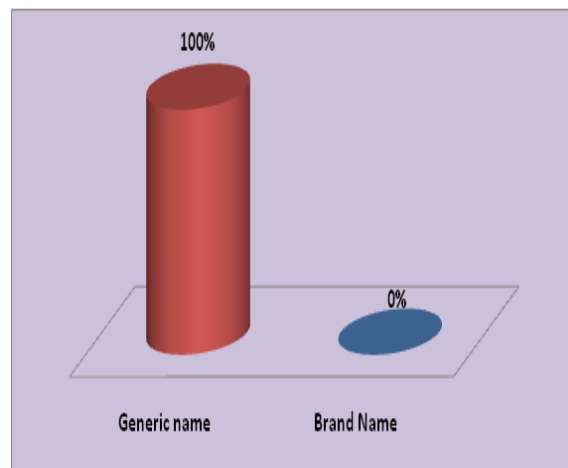

Figure 5.6: PRESCRIPTION BASED ON GENERIC NAME OR BRAND NAME

5.9 NUMBER OF DRUGS PER PRESCRIPTION

Out of 110 prescriptions of ADS patients in Psychiatry department, 18 patients were prescribed with more than 10 drugs.

Table 5.9: NUMBER OF DRUGS PER PRESCRIPTION

Number of drugs	Number of patients (%)
1-5	69(62.72%)
6-10	23(20.90%)
More than 10	18(16.32%)

Figure 5.7: NUMBER OF DRUGS PER PRESCRIPTION

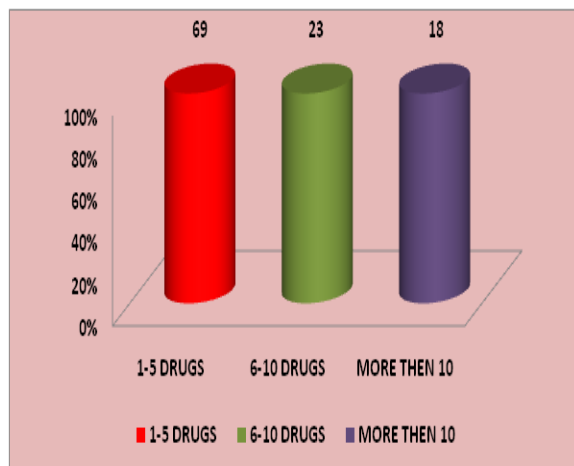Figure 5.8: PERCENTAGE OF DOSAGE FORM DISTRIBUTION

5.10 NUMBER OF DOSAGE FORM DISTRIBUTION

Out of 110 prescription of ADS patients from psychiatry department were prescribed with different dosage forms, Tablet110 (100%), Syrup 11 (10%) and Injection 110(100%).
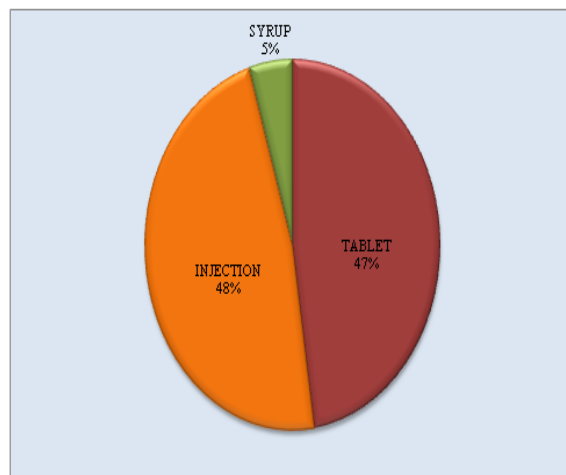
5.11 COST ANALYSIS FOR ANTI-CRAVING DRUGS

All the anti-craving drugs have been prescribed with the generic name and those drugs were Baclofen, Acomprosate, Naltrexone.

The cost of Baclofen per prescription was INR 149 when 10 tablets is prescribed , and the cost of acomprosate per prescription is INR 57 when 10 tablet is prescribed same as in the case of cost of tablets Naltrexone per prescription is INR 350 when 10 tablet is prescribed.

Table 5.10: Cost Of Anti-Craving Drugs

S.NO	ANTI-CRAVING DRUGS WITH GENERIC NAME	COST OF PER PACK (INR)	COST OF EACH TABLETS (INR)	% OF PATIENTS
1.	BACLOFEN	INR 149	INR 14.9	93.64%
2.	ACOMPROSATE	INR 57	INR 5.7	4.55%
3.	NALTREXONE	INR 350	INR 35	1.82%

Table 5.11: AVERAGE COST OF ANTI-CRAVING DRUGS PER PATIENTS

S.No	Anti-Craving Drugs Prescribed With Generic Name	Total Number Of Days of all patients	Total Number Of Patients	TOTAL COST (INR)	Cost per patients	% Of Cost Per patients	% Of Patients
1.	BACLOFEN	1834	103	27326.6	265.3	38.8%	93.6%
2.	ACOMPROSATE	55	5	940.5	188.1	2.6%	4.6%
3.	NALTREXONE	16	2	560	280	0.71%	1.8%

Drug utilization and costs are represented in fig no.08. The anti-craving cost analysis showed that Baclofen used for 93.64% patients of the total number of patients include in the study. And its utilization represents higher percentage of the overall anti-craving drugs. The other two drugs Acomprosate and Naltrexone were found less utilization then the Baclofen. The comparison in between Anti-craving drugs, Baclofen is much costly then the Acomprosate

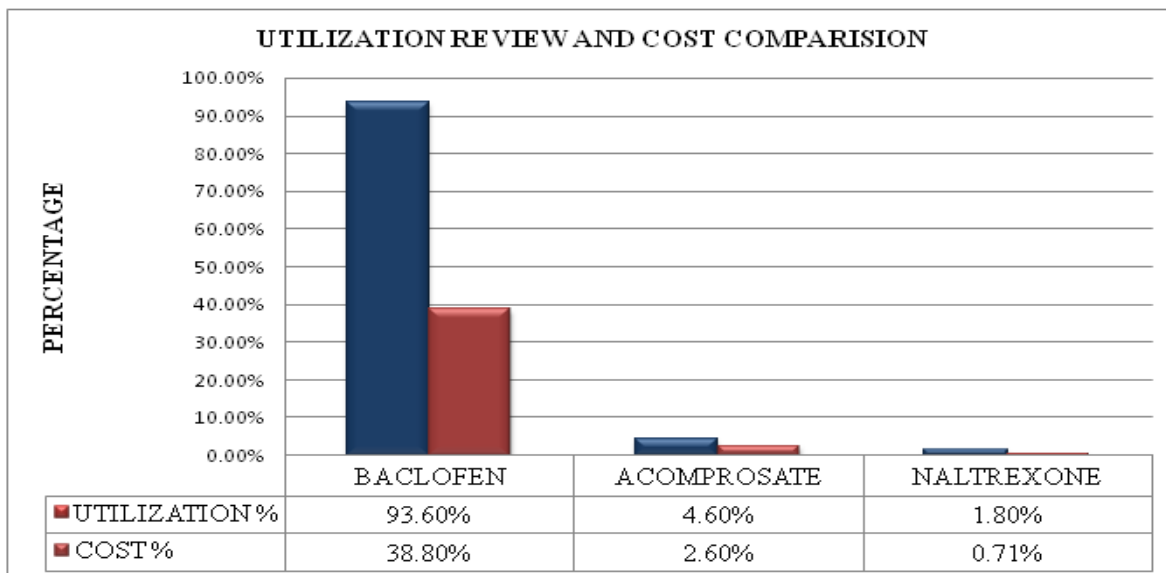and Naltrexone because for longer duration of

time and more patients.

Figure 5.9: UTILIZATION REVIEW AND COST COMPARISION

It was not surprising that the expenditure on Baclofen out of total Anti-craving drugs expenditure was relatively high because of the commonly used drug and longer duration of therapy. Acomprosate per tablet found to be a cheapest Anti-craving drug and Naltrexone is very costly among all but used in less percent of patients.

The Average cost per patients prescribed with Baclofen is found to be INR 265.3 , Acomprosateis found to be INR 188.1 and Naltrexone is found to be INR 280 .

DISCUSSION

A prospective Observational study was conducted for a period of 6 months in the psychiatric department of a tertiary care hospital.

Alcohol dependence syndrome is estimated to cause 2.5 million death per year. prevalence of ADS in India is 20 to 36% in 2014.

We aim to evaluate the study of prescribing pattern of ADS medication in psychiatric department and to compare the prescribing pattern with standard guidelines.

Total number of 110 prescription from 110 patients for observed and the following evaluations were made from the observed data

the incidence of ADS is more in male (98.19%) (Tables 5.1) than females (1.82%) (Tables 5.1) which is same as observed in previous studies, which shows higher incidence of ADS in males.
Patients in the age group of 36-55yrs (72.73%) (Table 5.1) have more incidence of ADS than the age group of 18-35 yrs (24.55%) (Table 5.1) and > 55 yrs(2.73%) (Table 5.1).

In our study it has been seen that ADS is common problem for people with habit of drinking alcohol since long period of time.
In our study we found that 42.73% patients have been diagnosed with pure ADS, followed by 56.38% with ADS with other complications (Table 5.2).

In our study the severity of the ADS patients have been examined by the AUDIT SCALE, which reveals that, 62.73% patients suffering with high level of severity (Table 5.3) in among 28.18% medium level severity (Table 5.3), and 9.09% severe level severity (Table 5.3).

In our study we found that, to calculate the duration of benzodiazepine therapy , the CIW-Ar SCALE have been administered to examine the severity of withdrawal symptoms of alcohol in all the ADS patients , we found that (55.45%) patients were falls under the moderate alcohol withdrawal (Table 5.4) in among all (35.45%)

patients falls under the mild alcohol withdrawal (Table 5.4) and (9.09%) patients were fall under the sever alcohol withdrawal (Table 5.4).

To examine the alcohol dependence level of each patients , SADD SCALE have been used, according to which we found that (85.45%) patients were high dependence to alcohol consumption (Fig 5.2) among all (11.82%) patients found medium dependence to alcohol consumption (Fig 5.2) and (2.73%) patients found low dependence to alcohol consumption (Fig 5.2).

According to our study, the most commonly prescribed Anti-Craving drugs were Baclofen,Acomprosate, Naltrexone. (93.64%) patients were prescribed with Baclofen (Fig 5.3), (4.55%) patients prescribed with Acomprosate (Fig 5.3), and (1.82%) patients prescribed with Naltrexone (Fig 5.3). we found in our study that Baclofen and Acomprosate and Naltrexone prescribed in the form of Tablet.

Other classes of drugs were also prescribed to the ADS patients according to their complications like, PPI (12.72%) (fig 5.4), Benzodiazepine (100%) (fig 5.4), Multivitamin (100%) (fig 5.4), Anti-Psychotic (100%) (fig 5.4), Anti-hypertensive (1.82%) (fig 5.4), Anti-diabetic (0.91%) (fig 5.4), Anti-emetic (8.12%) (fig 5.4), NSAID (4.55%) (fig 5.4), Anti-biotic (3.64%) (fig 5.4), Anti-convulsant (4.55%) (fig 5.4).

According to our study we found that (1 to 5) number of drugs prescribed to (62.72%) patients (Table 5.8), (6 to 10) number of drugs prescribed to (20.90%) patients (Table 5.8), more then 10 number of drugs prescribed to (16.32%) patients (Table 5.8). More than 3 drugs prescribed to the patients means indicated of presence of other complications.

The cost analysis of various anti-craving drugs have been found accourding to our studies that the average cost of Baclofen per patient is INR 265.3 which is less then as comparison to Naltrexone INR 280 but utilization of Baclofen is more than the other anti-craving drug.

The patients prescribed with Baclofen is more than the patients prescribed with Naltrexone

and Acomprosate . The average utilization of Baclofen is (93.6%) (Table: 5.11) more than other Acomprosate is (4.6%) (Table: 5.11) and Naltrexone (1.8%) (Table: 5.11).

CONCLUSION

In study it was found that patients between age group 36-55years have high incidence of Alcohol dependence syndrome and Among ADS patients Males are higher than females. Most of ADS patients have co-morbid conditions; therefore, they require more than one medication for their proper treatment. Among the co-morbid conditions ADS with in withdrawal uncomplicated were accounted the more. Among Anti-craving drugs baclofen prescribed to the more patients then other drugs which indicate the more utilization of Baclofen then the others anti-craving. Among all the ADS patients 62.73% patients were found high level severe measured by AUDIT scale. Total number of 110 patients 55.45% patients was found on the range of moderate alcohol withdrawal symptoms according to the CIW-Ar scale. Among all the ADS patients, 85.45% patients were found high dependence to the alcohol which measured by the SADD scale. Anti-psychotic, multivitamins, and benzodiazepine prescribed to all the ADS patients to treat the other complications. Cost comparison showed that Naltrexone was more expensive anti-craving drug than baclofen and acomprosate but baclofen drug utilization is more in among ADS patients and for longer period of time, according to this study baclofen showed high cost burden on ADS patients.

FUTURE OBJECTIVE

- ➢ The development of medications to address the spectrum of unhealthy alcohol use across the broad range of health care settings has the potential to maximize benefits for future patients.
- ➢ To optimize medication treatment outcomes, there is need to assess both the appropriate level of counselling

(from minimal to more intensive) and the appropriate methods to enhance medication adherence for individual patients.

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