Section A-Research paper
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Utilization patterns of CNS drugs in a multi health specialty hospital in Jeddah: A retrospective observational study

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Abstract

Objective Drugs play an essential role in preventing, maintaining, and restoring health. However, many medications affect the central nervous system (CNS) due to the potential abuse of the drugs and possible drug addiction.

Materials and methods: A retrospective observational study was performed to investigate CNS drug prescriptions, identifying their utilization patterns and the prevalence of their potential abuse, in addition to their impact among citizens in Jeddah. Electronic health records data from January 2016 to March 2022 were evaluated to analyze the trends of overuse, wrong usage, and refilling without a proper justification in a multi-health specialty hospital. All the data was collected using a Microsoft Excel sheet, and the chi-square test was used for statistical analysis using the SPSS software.

Result: A convenience sample of 12687 patients with one or more CNS drugs prescribed for their ailments was selected. The results showed that the most used drug throughout the duration between January 2016 and March 2022 was phenytoin (100 mg) followed by Carbamazepine (200 mg) then followed by Tramadol 50 mg then Carbamazepine 400 mg with greater consumption was by males for all drugs except for Carbamazepine 400 mg. Less consumption was for Clonazepam 2 mg and

Lorazepam 1mg and the least prescribed drug was Carbamazepine 100 mg/5ml Syrup throughout the whole investigated period.

Conclusion: The overall consumption patterns from 2016 till 2022, showed greater use of CNS drugs among both genders. Thus, it is recommended that psychiatrists should have controlled prescriptions to reduce the likelihood of dependence on the drugs.

KEY WORDS: CNS drugs, drug addiction, drug abuse

Introduction

Central nervous system (CNS) drugs have been used for a long time for multiple human-health-related purposes due to their various pharmacological properties [1]. Benzodiazepine (BNZs) and gamma-aminobutyric acid (GABA) are examples that were commonly used at local and international practices to treat CNS-related diseases like epilepsy, neuropathic pain, and generalized anxiety disorder (GAD) [2,3]. While researchers discovered their mechanism of action, clinicians began uncovering their abuse and dependence. The reported abuse potential of these medications [1,3,4,5] may limit their use (1,5,6]. It is also quite known that their pharmacokinetic variations, their rapid onset of action (higher lipophilicity) and shorter half-life usually exhibit greater abuse potential [1,4].

People with a great risk of abuse and dependence often have a personal or family history of substance use disorders. It's expected that drugs such as BNZs will have a higher level of dependence in countries where they are easily accessible, such as Asia and South America. Existing literature indicates that the highest rates of abuse are in Europe and the U.S. due to diverted prescriptions [1,7]. The increasing rate of people with dependence are either those who use the drugs deliberately for recreational use or those who are prescribed the BNZs and develop dependence unintentionally. The dependence is usually described if, in the last 12 months, the patient has experienced a strong compulsion to take the drugs, difficulty controlling how to use the drugs, neglect of others, and continued use of the drug despite having negative consequences.

It is worth mentioning that CNS drug misuse and abuse are an escalating issue. In the U.S., about 75 million CNS drug prescriptions were written in 2008. Approximately 4% to 5% indicated their use by the general population, while 2.3% to 18% of U.S. residents have also misused sedatives for non-medical use. Experts estimated that CNS drug prescriptions for non-medical reasons reached about 18 million among people aged 12 years and older [1,2,4]. Criteria for dependence or abuse were also met by about 10% of individuals using sedatives. Later, in 2010, approximately 186,000 new CNS drug abusers were estimated. Furthermore, emergency departments reported a steep rise in CNS drug-related visits, reaching an increase of 139% [1].

The current literature indicates a lack of international consensus on what leads to the misuse and abuse of psychoactive prescriptions and their possible risk factors. Similarly, the extent and prevalence of abuse of CNS drugs prescribed in KSA are either not available or not published.

Hence, the current research project's objectives are to identify the prevalence of potential abuse of CNS drugs in Jeddah, identify the impact of their potential abuse, and ultimately determine the methods of their abuse prevention [1,7].

Material and methods

1. Ethical Consideration

The current retrospective observational study protocol was registered and approved by the institution ethics review committee, on the 27th of December,2021 and was provided by an IRB number: IRB-02-19122021.

2. Study Design and Study Settings

The study is a single site, retrospective observational prescription analysis study which took place at King Abdullah Medical Complex, Jeddah, KSA.

3. Data Collection

Convenience (non-probability) sampling was used as a sampling technique where the data from the patient records were collected from January 2016 to March 2022 for patients who received a prescription for CNS drugs in King Abdullah Medical Complex, Jeddah, KSA, to be analyzed. Over usage, wrong usage, early refilling with no proper justification, and overdose of the drug consumption were all reported relative to the demographic data of patients.

4. Eligibility Criteria

The data included patients of all ages on CNS medications of intermediate action. Patients who did not use CNS drugs or used different types of CNS drugs, such as short intermediate and long-intermediate action drugs were excluded. The study tested the probability of dependence and abuse based on the number of people using the set types of drugs and determined the increase of specialists' bias on the prescription of certain drugs.

5. Statistical Analysis

All the data were collected using a Microsoft Excel sheet, and SPSS software was used for statistical analysis. The chi-square test was employed for the analysis, and the level of significance for the present study was set to 0.05. The data started by being analyzed based on the sample population and all the medication usage among both genders of all the participants, based on the percentages of the participants and the rate of drug consumption.

Results

The overall results of the current study, shown in Table 1, showed that the most used drug throughout the duration between January 2016 and March 2022 was phenytoin (100 mg) in a total of 4786 patients, with a greater use of 62% among males (n=2975). The second most prevalent drug used was Carbamazepine (200 mg) in a total of 3689 patients, with a greater consumption by males (51%, n=1871) followed by Tramadol 50 mg with a predominant use in males too (n=1093, 58%) out of a total use by 1875 patients. The fourth ranked drug used was Carbamazepine 400 mg with greater use by females (n=537, 53%) than males (n=481, 47%). Finally, lower consumption of Clonazepam 2 mg (n=959) and Lorazepam 1mg (n=608) with

much higher consumption among males (n=614, 64%) and 340(56%), respectively. The least prescribed drug was Carbamazepine 100 mg/5ml Syrup of a total of 29 patients (n=29) throughout the whole investigated period, with the majority being consumed by males (n=27, 93%).

Drug	**Number and %**		**Total**
	Males	**Females**	
Carbamazepine 200 mg	1871 (51%)	1818 (49%)	3689 (100%)
Carbamazepine 400 mg	481(47%)	537(53%)	1018(1018%)
Carbamazepine 100 mg/5ml Syrup	27(93%)	2(7%)	29(100%)
Clonazepam 2 mg	614(64%)	345(36%)	959(100%)
Lorazepam 1mg	340(56%)	268(44%)	608(100%)
Phenytoin 100 mg	2975(62%)	1811(38%)	4786(100%)
Tramadol 50 mg	1093(58%)	782(42%)	1875(100%)

Table 1: Overall number and percentage of each gender using drugs over the seven years (January 2016 – March 2022)

Discussion

The research study presented a description of data from a multi health specialty hospital in Jeddah (King Abdullah Medical Complex) prescribing CNS drugs to the North Jeddah population to determine the utilization patterns of CNS drugs for the entire population using existing data records for medication related to CNS. The best way to understand the prevalence and the trend of the drug use was by comparing the most used CNS drugs in the population among both genders. Moreover, the prescription rate provided a good overview of better alternatives, which in turn could help stakeholders to decide new policies to control patients' dependence or abuse of such drugs in KSA. Patterns in the consumption of medication such as CNS showed the predisposing conditions affecting a community and the measures that can be used when offering insight and preventive measures [8]. In most cases proved that the outcome may be overlooked based on the economic value gained by the manufacturers [7,9].

The hospital system (King Abdullah Medical Complex) has the most extensive health record systems that can make patient data available for use and the development of sustainable efforts. The study results helped show actions that psychiatrists took in the prescription of medication to make patients develop low dependence or abuse. The data was diverse as it covered seven years, entirely analyzing all patients that could be included in the study. The use

of convenient non-probability methods ensures that no bias was developed while selecting the sample of our study. In our health care institutions' database, there were 12687 patients with one or more CNS drugs prescribed for their ailments. The outcome of the dataset that was collected from such a diverse population over seven years makes it hard to meet the same sample of people at the same time within the year which estimated the rate of the drug use as well as its type.

Patients on intermediate action CNS drugs were only included in our study as the effects of the medication were normally mild, not as compared to short-term action CNS drugs which have the highest risk of developing abuse and dependence. The data obtained was very reliable, as the source of prescriptions was the official hospital database. Results showed that all selected medications were actually used among the sample population. CNS drugs consumed were mostly obtained through prescriptions, and based on the nature of the treatment, the psychiatrists were more likely to start with a less dependence developing anti-epileptic drugs. However, the usage by the patients was the problem. Some of the patients overdosed on medicines, while others used the medication wrongly or did not have proper justification for their use of such drugs, despite being prescribed by their specialized caregiver.

The need to get greater amounts of the prescribed drugs by the patients and get the same withdrawal signs calling for a stronger medication could offer insight into levels of people's dependence where it was directly proportional. Furthermore, as outcome measurements, patient-related data, including demographic data, diagnosis, current disease status, drugs used by the patient, etc., collected along with the indication and frequency of the prescribed drugs, particularly for the most prescribed medications, including the following: Carbamazepine 200 mg Tab, Carbamazepine 400 mg Tab, Carbamazepine 100 mg/5ml, Clonazepam 2 mg Tab, Lorazepam 1 mg Tab, Phenytoin 100 mg Cap and Tramadol 50 mg Cap.

Of all the CNSs prescriptions, Phenytoin 100 mg Cap had the greatest usage among the population. The data showed that approximately 40% of the total sample which included 12867 participants were on Phenytoin 100 mg throughout the observed duration; 62% of them were males. This drug is an antiepileptic drug that showed that more men have a higher resultant effect of developing the epileptic disease than women, and most of the population is easily affected by the same disorder [8]. The second consumed drug was carbamazepine 200 mg tablets which was prescribed to about 30% of the total sample. The rate of use between males and females was nearly equal, with 51% for males. The medication was also an antiepileptic.

This moderate use of carbamazepine 200 mg tablets, offered to patients based on their body type, maintained effective and safe relationships within the population while avoiding creating room for dependency and abuse of the drugs based on the existing use of the medication [10]. The epileptic medication has been said to have different side effects other than dependence and abuse, such as the development of cardiovascular infections and itching when certain foods are used with the medication. Some races also react defiantly to the CNS

medications. Thus, the predisposing factors associated with the use of the medication need to be evaluated and measures put in place to analyze the outcomes.

Tramadol 500 mg Cap had the third prevalence of 15% of the total studied population. The rate of use by a male was higher than female patients to reach 58%. It was vital to mention that the drug was an intermediate-acting CNS, and it was mainly used as a painkiller and withdrawals, which gave the population a bigger perception of the trend of the use of medication. Carbamazepine 400 mg tablet, which was also an antiepileptic drug, was used by 8% of the population, which was more used by females (53%). The prevalence of use showed a variation from the trend, where men had the usual highest rate of use.

Clonazepam 2 mg tablet, which was used as an intermediate action with an alienation period of 20-80 hours and used for seizures, had a prevalence of 7.4% of the total population, where male consumption was higher reaching 64%. Lorazepam, which is a BNZ used for anxiety, was used by 4.7% of the entire population. The rate of male to female indicated that 56% of users were males. The lesser value of clonazepam, a 2mg tablet, and lorazepam, a 1mg tablet, among all drugs consumed indicated that most of the users have developed resistance to the use of higher concentrations of drugs that offer more neural activation and development. The least drug used was carbamazepine 100mg/5ml syrup which was used as an antiepileptic drug and reached a percentage of only 0.22% of the total population. Male participants still had the lead with a percentage of 93%. It could be evaluated to indicate that in the population, men had the highest risk of using CNS medication, and the focus was more on seizures and epilepsy, which made the community more vulnerable [11].

An analysis of the age range of the participants and the probability of use of CNS drugs could be seen that the highest population to take the prescription in all the years was from 60-100, followed by 40-59 and 30-39. As people get older, the chances of experiencing epileptic conditions get higher, and the end of taking antiepileptics and stress reduction medication is usually higher. The predisposing condition for the use of CNS drugs tended to increase by age which could be attributed to the environmental conditions and greater responsibilities. The peak seems to rise at the age range of 30-39 years.

In the current study, the community hardly disclosed their personal information, thus making it hard for the researcher to obtain meaningful results. Moreover, it is insufficient to conclude that the population of Saudi Arabia in Jeddah hospital had great potential for abuse. The area uses three types of carbamazepine mainly as an antiepileptic, in controlling seizures and nerve pains. The root cause of the population having epileptic and seizure conditions within the same regions is most likely to be attributed to family historical conditions that make the people susceptible to the use of the medication. Literature has indicated that the higher the chance of having more lines in history, the higher the risk of developing dependence and abuse [12]. Indeed, the data did not provide any information about the risk or prevalence of abuse.

However, the fact that in 2016-2017 the outcome of prescription of CNS medications seems to increase by shifting to greater concentrations such as carbamazepine 400 mg tablets.

Conclusion

The overall consumption patterns of CNS drugs, showed increased intake among both genders along successive years.

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