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Original Article

EVALUATION OF PRESCRIBING PATTERN IN ORTHOPEDICS DEPARTMENT IN A TERTIARY CARE HOSPITAL: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Objective: To study the demographic profile and prescription pattern in Orthopedics department in a tertiary care hospital.

Methods: A prospective, observational and cross-sectional study design was adopted for this study. A total of 144 patients were enrolled and their prescriptions were analyzed for three months. The data was analyzed by using a Microsoft Excel Worksheet. The Anatomical Therapeutic Chemical classification system and defined daily dose were used to classify the prescribed drugs.

Results: Out of 144 patients enrolled, 105 (72.92%) were male and 39 (27.08%) were female. Maximum patients were between 21-40 y of age. The mean age of the patients was 35.04±18.53. The average number of drugs per prescription was 4.84. Fracture of limbs (58.33%) was the most common diagnosis. Analgesics were the most commonly prescribed drugs. Diabetes was the most common comorbidity. The percentage of drugs prescribed by generic names was 48.06, and that from the essential drug list was 47.78. The percentage of fixed-dose combinations used was 28.55.

Conclusion: Although we found that a good percentage of drugs were prescribed from essential drug list but, this practice has to be increased in future. It is also seen that average number of drugs per prescription was high and percentage of drugs prescribed by generic names was less than that by brand names. So, there is immense scope of improvement for prescribing in the hospital.

Keywords: Orthopedics, Essential drug list, Generic name, Anatomical therapeutic chemical classification system, Defined daily dose, Fixed dose combinations

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INTRODUCTION

Prescription writing is an art. It is the direction the prescriber gives to both pharmacist and patient for the proper use of drugs [1]. Thus, a prescription reflects the physician's perspective towards the particular disease and the role of the medication in its treatment. It also provides an understanding of the essence of the healthcare delivery system [2].

Monitoring of prescriptions and drug utilization studies help in examining the recent trend of prescription patterns which helps in identifying the problems and providing feedback to prescribers. Thereby, awareness can be created about the irrational use of drugs. It is an inevitable need to investigate thoroughly the factors affecting the prescribing patterns of the doctor to improve the prescription quality and promote rational prescription patterns [3].

World Health Organization (WHO) definition of rational prescription is "Rational use of medicines requires that patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at lowest cost to them and their community." [4].

WHO developed a set of core drug-use indicators that include the average number of medications per prescription, percentage of antibiotics, percentage of generics and brands, percentage of injections and percentage of drugs prescribed from an essential medicine list [5].

Drug utilization studies are mainly of two types: quantitative and qualitative [6]. WHO defined drug utilisation as the marketing, distribution, prescribing, dispensing and administration of medication, with consideration of its use economic burden [5]. International agencies such as the WHO and International Network of Rational Utilization of Drugs have deciphered the importance of drug utilization studies in the promotion of rational drug use and their application have helped them to evolve standard drug use indicators and data collection methods [7].

Defined Daily Dose (DDD) is an important tool to compare drug utilization among different clinical setups within a country and between different countries. DDD/100 bed-days provides a rough estimate of drug consumption in hospital inpatients and it is a fixed unit of measurement independent of formulation and price [8, 9].

Physicians in their day-to-day practice, prescribe a greater number of fixed-dose combinations (FDCs) [10]. Unfortunately, most of them are irrational and harmful. It is crucial that principles of rational prescription are adhered to and an important step toward this is by prescribing drugs only published in the WHO Essential Medicines List (EML) or National List of Essential Medicines (NLEM).

The prescribing pattern of drugs in the orthopedics field has to be regularly observed as many of the drugs prescribed have unwanted adverse effects. The objective of conducting a prescribing pattern study is to monitor, evaluate, and if necessary, suggest modifications in the prescribing behavior of medical practitioners to make medical care cost-effective and rational [11].

This study was undertaken as an attempt to know the disease pattern and also prescribing practices in the orthopedics in-patient department of the tertiary care hospital of Guwahati, Assam. Moreover, this study was also performed to evaluate whether the prescribed drugs were enlisted under the WHO Model List of Essential Medicines 2021 (22nd list) and prescribed by generic name.

MATERIALS AND METHODS

A prospective, observational and cross-sectional study design was adopted for this study. The data was collected from October to December 2022 at Orthopedics in-patient department of a tertiary care teaching hospital in Guwahati, Assam. Patients of all age groups,

both male and female patients from the Orthopedics in-patient department with other comorbidities were included in the study. The patients were enrolled only after their prior consent. Patients from the outpatient department, those admitted to other in-patient department, patients who absconded or discharged against medical advice and pregnant women were excluded from the study. The Institutional Ethics Committee permission was taken to conduct this study (IEC approval no. MC/190/2007/Pt-II/JUN-2022/17).

The sample size of this study was 144 and the data from the prescription of the patient was noted in profile forms and entered in a Microsoft Excel Worksheet and descriptive statistics such as mean, frequency and percentage were calculated.

The Anatomical Therapeutic Chemical (ATC) classification system and defined daily dose (DDD) were used to classify the prescribed drugs. The ATC system divides the active substances into groups and subgroups, and the DDD is the assumed average maintenance dose per day for a drug when used for its main indication in adults. The DDD provides a fixed unit of measurement, independent from, e. g., strength and price, which enables research on patterns in the prescription of drugs [12].

RESULTS

In the present study, 144 patients were enrolled and their prescriptions were analyzed during 3 mo. We observed that there were 697 drugs prescribed and the average number of drugs per prescription was 4.84. Out of 144 patients enrolled, 105 (72.92%) were male and 39 (27.08%) were female (fig. 1). Demographic details revealed that the patients of age between 21-40 y were more (56 patients) followed by 41-60 y (41 patients), then 0-20 y (36 patients) and 61-80 y (11 patients) (table 1). This described the effect of age factor on disease distribution. The mean age of the patients was 35.04±18.53. The majority of the patients who were admitted in-patient ward of the Orthopedics Department had suffered from a fracture of limbs i.e. 84(58.33%), followed by 38(26.39%) patients with other orthopedic ailments,15(10.42%) patients with soft tissue injury, 4(2.78%) patients with osteomyelitis and 3(2.08%) patients with congenital anomalies (fig. 2). Analgesics were the most commonly prescribed drugs in the Orthopedics Department. There were 190 analgesics (27.26%), followed by 169 antibiotics (24.25%), 119 gastroprotective drugs (17.07%), 80 miscellaneous drugs (11.48%), 57 Calcium and Vitamin D (8.18%), 51vitamins (7.32%) and 31 antiemetics (4.45) (fig. 3).

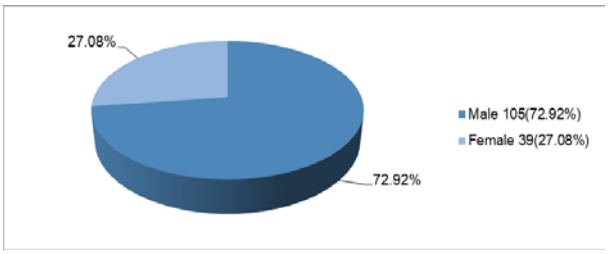

Fig. 1: Gender distribution

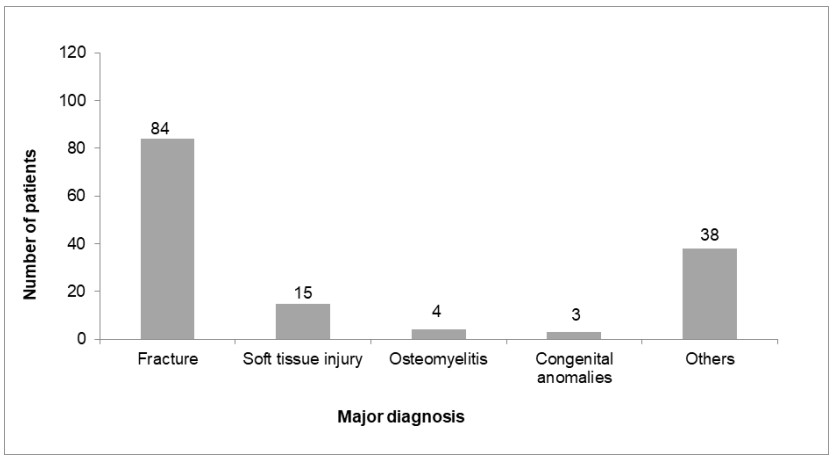

Fig. 2: Major diagnosis

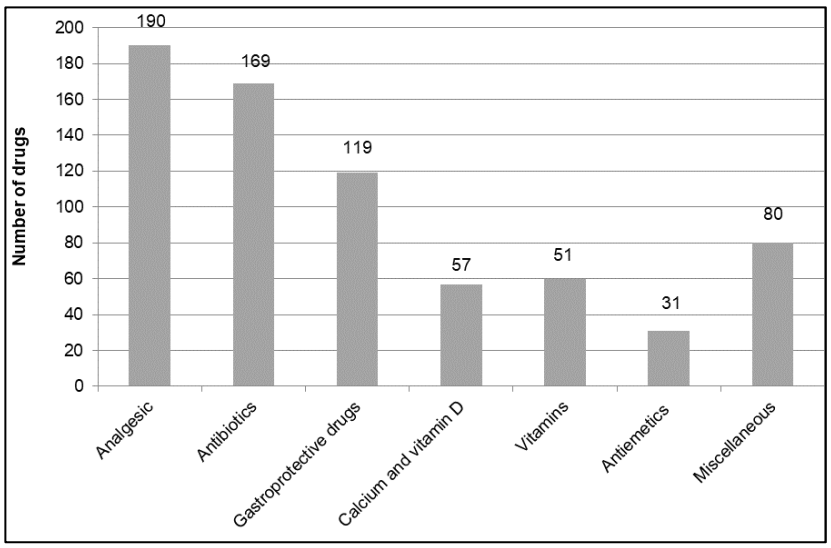

Fig. 3: Therapeutic categories of the prescribed drugs

Table 1: Age distribution

Age range (Years)	Number of patients	Percentage (%)
0-20	36	25
21-40	56	38.89
41-60	41	28.47
61-80	11	7.64

In table 2: ATC classification of 190 analgesics along with their individual WHO-assigned DDD (in mg), routes of administration and number of individual analgesics have been mentioned.

Table 2: Analgesics with ATC code, DDD (mg) and route of administration

Name	ATC code	DDD (mg)	Adm. R	Total (%)
Paracetamol	N02BE01	3000	Oral Parenteral Rectal	55(28.95)
Diclofenac	M01AB05	100	Oral Parenteral Rectal	30(15.79)
Aceclofenac	M01AB16	200	Oral	6(3.16)
Ibuprofen	M01AE01	1200	Oral Parenteral Rectal	13(6.84)
Ketorolac	M01AB15	30	Oral Parenteral	8(4.21)
Indomethacin	M01AB01	100	Oral Parenteral Rectal	3(1.58)
Etoricoxib	M01AH05	60	Oral	2(1.05)
Aceclofenac+Paracetamol	M01AX	200 3000	Oral	59(31.05)
Aceclofenac+Serratiopeptidase+Paracetamol	M01AX	200 0.9 3000	Oral	2(1.05)
Aceclofenac+Serratiopeptidase	M01AX	200 0.9	Oral	1(0.53)
Paracetamol+Diclofenac	N02BE51	3000 100	Oral	1(0.53)
Paracetamol+Etoricoxib	N02BE51	3000 60	Oral	1(0.53)
Paracetamol+Ibuprofen	N02BE51	3000 1200	Oral	5(2.63)
Tramadol+Acetaminophen	N02AJ15	300 6000	Oral	3(1.58)
Etodolac+Thiocolchicoside	M03BX	400, Not assigned	Oral	1(0.53)

In table 3, ATC classification of 169 antibiotics along with their individual WHO-assigned DDD (in mg), routes of administration and number of individual antibiotics have been mentioned.

Table 3: Antibiotics with ATC code, DDD (mg) and route of administration

Name	ATC code	DDD (mg)	Adm. R	Total (%)
Cefuroxime	J01DC02	500 3000	Oral Parenteral	8(4.73)
Amikacin	J01GB06	1000 590	Parenteral Inhale. Solution	49(28.99)
Ceftriaxone	J01DD04	2000	Parenteral	64(37.87)
Metronidazole	J01XD01	1500	Parenteral	14(8.28)
Linezolid	J01XX08	1200 1200	Oral Parenteral	3(1.78)
Vancomycin	J01XA01	2000	Parenteral	1(0.59)
Meropenem	J01DH02	3000	Parenteral	3(1.78)
Teicoplanin	J01XA02	400	Parenteral	1(0.59)
Tigecycline	J01AA12	100	Parenteral	1(0.59)
Fluconazole	J02AC01	200 200	Oral Parenteral	1(0.59)
Cefixime	J01DD08	400	Oral	1(0.59)
Cefuroxime+Clavulanic acid	J01DC50	500 3000	Oral Parenteral	5(2.96)
Piperacillin+Tazobactum	J01CR05	14000	Parenteral	15(8.88)
Ceftriaxone+Sulbactum	J01DD63	2000	Parenteral	2(1.18)
Amoxicillin+Clavulanic acid	J01CR02	1500 3000	Oral Parenteral	1(0.59)

In table 4: ATC classification of 119 gastroprotective drugs along with their individual WHO-assigned DDD-Defined Daily Dose (in mg), routes of administration and number of individual gastroprotective drugs have been mentioned.

Table 4: Gastroprotective drugs with ATC code, DDD (mg) and route of administration

Name	ATC code	DDD (mg)	Adm. R	Total (%)
Pantoprazole	A02BC02	40	Oral	100(84.03)
		40	Parenteral	
Esomeprazole	A02BC05	30	Oral	1(0.84)
		30	Parenteral	
Rabeprazole	A02BC04	20	Oral	12(10.08)
Lansoprazole	A02BC03	30	Oral	1(0.84)
Rabeprazole+Domperidone	A02BC54	20	Oral	2(1.68)
		30		
Pantoprazole+Domperidone	A02BC54	40	Oral	1(0.84)
		30		
Esomeprazole+Domperidone	A02BC54	30	Oral	2(1.68)
		30		

In table 5, ATC classification of 80 miscellaneous drugs along with their individual WHO-assigned DDD-Defined Daily Dose (in mg), routes of administration and number of individual miscellaneous drugs have been mentioned.

Table 5: Miscellaneous drugs with ATC code, DDD (mg) and route of administration

Name	ATC code	DDD (mg)	Adm. R	Total (%)
Tab Collagen Peptides type I, Sodium Hyaluronate, Chondroitin Sulfateand Vitamin C	D11AX57	Not assigned	Oral	1(1.25)
InjAminoacid	B05BA01	Not assigned	Parenteral	2(2.5)
Tab Trypsin and Bromelain	M09AB52	Not assigned	Oral	2(2.5)
Tab Trypsin, Bromelain andRutoside Trihydrate	M09AB52	Not assigned	Oral	38(47.5)
Tab Trypsin, Bromelain, Rutoside Trihydrate and Papain	M09AB52	Not assigned	Oral	10(12.5)
Tab Trypsin, Bromelain, Rutoside Trihydrate and Diclofenac	M09AB52	Not assigned	Oral	2(2.5)
Tab Trypsin	D03BA01	Not assigned	Oral	9(11.25)
Tab Trypsin-chymotrypsin	M09AB52	Not assigned	Oral	1(1.25)
Tab Anastrozole	L02BG03	1	Oral	1(1.25)
Inj Adalimumab	L04AB04	2.9	Parenteral	1(1.25)
Cap Thiocolchicoside	M03BX05	Not assigned	Oral	1(1.25)
Cap Calcitriol, Calcium carbonate, Vitamin K2-7, Methylcobalamin, L-Methyl Folate, Zinc Oxide and Magnesium	A11CC20	Not assigned	Oral	1(1.25)
Intravenous fat emulsion	B05BA02	Not assigned	Parenteral	1(1.25)
Tab Glutathione	V03AB32	Not assigned	Oral	1(1.25)
Fortified micronutrients	A11AA01	Not assigned	Oral	1(1.25)
Inj Tranexamic acid	B02AA02	2000	Oral	1(1.25)
			Parenteral	
Inj Tetanus Toxoid	J07AM01	Not assigned	Parenteral	1(1.25)
Tab Isoxsuprine	C04AA01	60	Oral	1(1.25)
			Parenteral	
Tab Clopidogrel	B01AC04	75	Oral	1(1.25)
Tab Rifaximin	A07AA11	600	Oral	1(1.25)
Syrup Di-sodium Hydrogen Citrate	B05CB02	Not assigned	Oral	1(1.25)
Inj Mannitol	B05BC01	Not assigned	Oral	1(1.25)
Tab Alprazolam	N05BA12	1	Oral	1(1.25)

In table 6: ATC classification of 57 Vitamin D and Calcium drugs along with their individual WHO assigned DDD-Defined Daily Dose (in mg), routes of administration and number of individual Vitamin D and Calcium drugs have been mentioned.

Table 6: Vitamin D+Calcium with ATC code, DDD (mg) and route of administration

Name	ATC code	DDD (mg)	Adm. R	Total (%)
Calcitriol	A11CC04	0.001	Oral	1(1.75)
			Parenteral	
Vit D3	A11CC05	0.02	Oral	3(5.26)
Calcium	A12AA20	500	Oral	13(22.81)
Calcium+Vit D3	A12AX	500, 0.02	Oral	39(68.42)
Calcium+Calcitriol	A12AX	500, 0.001	Oral	1(1.75)

In table 7, ATC classification of 51 Vitamins along with their individual WHO-assigned DDD (in mg), routes of administration and number of individual Vitamins have been mentioned.

Table 7: Vitamins ATC code, DDD (mg) and route of administration

Name	ATC code	DDD (mg)	Adm. R	Total (%)
Thiamine	A11DA01	50	Oral, Parenteral	2(3.92)
Thiamine+Bentonite forte	Not assigned	Not assigned		1(1.96)
Methylcobalamin	B03BA05	1.5	Oral	4(7.84)
		0.2	Parenteral	
Vitamin C	A11GA01	200	Oral, Parenteral	41(80.39)
Multivitamin	A11AB	Not assigned		3(5.88)

In table 8, ATC classification of 31 antiemetics along with their individual WHO-assigned DDD-Defined Daily Dose (in mg), routes of administration and number of individual antiemetic drugs have been mentioned.

Table 8: Antiemetics with ATC code, DDD (mg) and route of administration

Name	ATC code	DDD (mg)	Adm. R	Total (%)
Ondansetron	A04AA01	16	Oral Parenteral Rectal	31(100)

Out of 144 patients, along with the main diagnosis, comorbid conditions were also observed in 26 patients. To treat these comorbidities some other classes of drugs were prescribed. Of these 7 patients (26.92%) were prescribed with anti-diabetics, 4 patients (15.38%) with antianxiety, 4 patients (15.38%) with antiepileptics, 3 patients (11.54%) with antihypertensive, 3 patients (11.54%) with thyroid hormone, 2 patients (7.69%) with antipsychotic and 1 patient (3.85%) with central anticholinergic, 1 patient (3.85%) with aromatase inhibitor and 1 (3.85%) patient with gallstone dissolving drugs respectively (table 9).

Table 9: Distribution of drugs prescribed for associated comorbid conditions (N=26)

Other drugs	Number of patients (%)
Antidiabetic	7(26.92%)
Antianxiety	4(15.38%)
Antiepileptic	4(15.38%)
Antihypertensive	3(11.54%)
Thyroid hormone	3(11.54%)
Antipsychotic	2(7.69%)
Central anticholinergic	1(3.85%)
Aromatase inhibitor	1(3.85%)
Gallstone dissolving drugs	1(3.85%)

The rationality of a prescription can be evaluated by the total number of drugs prescribed for a patient. The more the number of drugs prescribed, the more the development of resistance, adverse drug reactions and other drug-related problems. Indirectly it may affect the patient's adherence towards treatment. However, according to the severity of the disease, multiple drugs are prescribed for the treatment [13]. In the present study, 45 patients (31.25%) were prescribed with 3-4number of drugs, followed by 31 patients (21.53%) with 1-2 drugs,30 patients (20.83%) with 5-6 drugs, 23 patients (15.97%) with 7-8 drugs and 15 patients (10.41%) with equal or more than 9 drugs (fig. 4).

Rationality of prescriptions was assessed using WHO core prescribing indicators, values of which are presented in table 10.

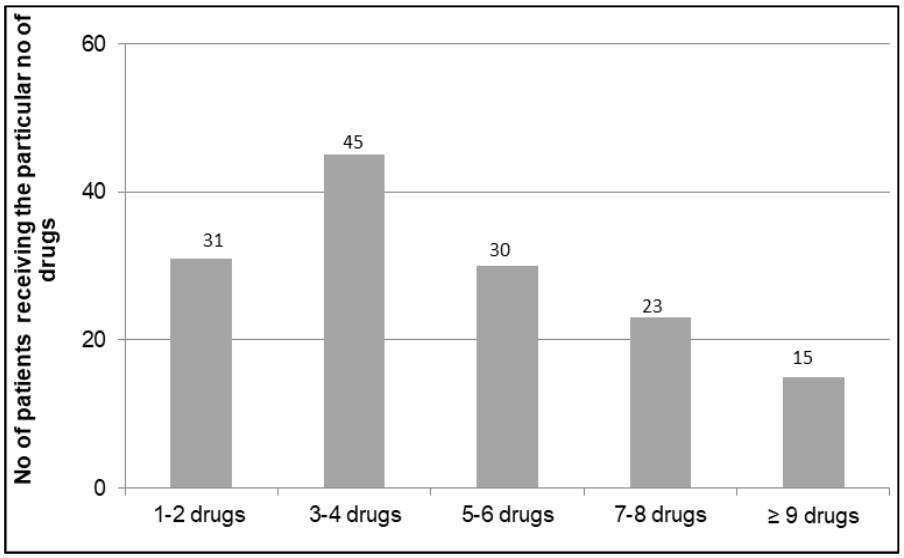

Fig. 4: Number of drugs per prescription with number of patients

Table 10: The WHO core prescribing indicators assessed for drug prescription

Prescribing indicators assessed	Average/Percentage
Average number of drugs per encounter	4.84
Percentage of drugs prescribed by generic names	48.06
Percentage of encounters with antibiotics	24.25
Percentage of encounters with injections	43.90
Percentage of drugs from essential drug list	47.78

In this study out of 697 prescribed drugs, 391 drugs were given orally and 306 drugs were given parenterally as shown in fig. 5.

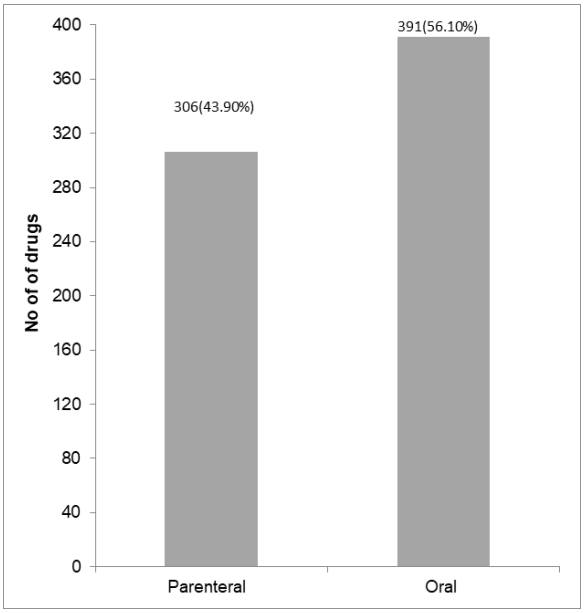

Fig. 5: Routes of administration

In this study, out of 697 prescribed drugs, 335 drugs were prescribed by their generic names and 362 drugs were prescribed by their brand names as shown in fig. 6.

The following table shows the number of fixed-dose combinations used in each category of drugs, along with their percentages (table 11). In our study, a total of 199 (28.55%) FDCs were used.

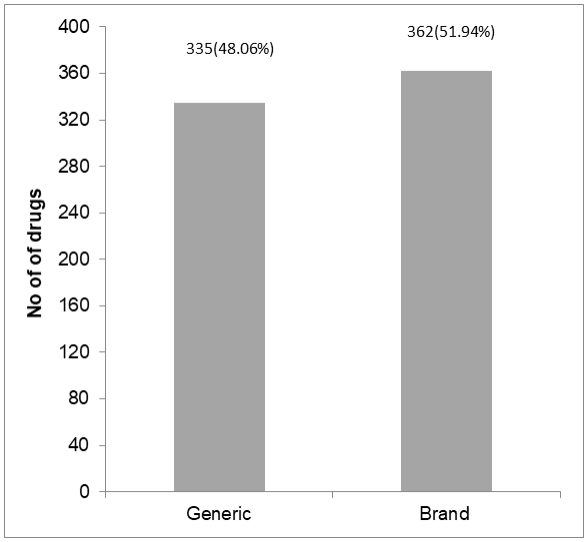

Fig. 6: Generic and brand drugs

Table 11: Fixed dose combination

Therapeutic categories of drugs	Number of FDCs used	Percentage
Analgesics	73	10.47
Antibiotics	23	3.30
Gastroprotective drugs	5	0.72
Calcium and vitamin D	40	5.74
Vitamins	4	0.57
Antiemetics and Miscellaneous drugs	54	7.75
Total	199	28.55

DISCUSSION

This study was carried out to know the prescribing pattern of drugs used in the Orthopedics In-patient Department of Gauhati Medical College and Hospital, Guwahati. During the period of study, sex-wise distribution of patients shows that male patients (105 out of 144) were found to be more than that of female patients (39). Male dominance was also found in Gupta *et al.* [14] study, where 315 male and 185 female patients were enrolled based on only non-steroidal anti-inflammatory drugs (NSAIDs) use. Again in our study, the number of patients was

higher in the age group of 21-40 y i.e. 56, which is similar to Ingle *et al.* [15] study where the number of patients was also more i.e. 91 in the age group of 18-40 y. When we compared the average number of drugs (4.84) prescribed in our study was found to be more than several other studies i.e. 3.5 in Alshakka *et al.* [16], 1.33 in Das *et al.* [17] and 1.9 in Shankar *et al.* [18] study, at par (4.72) with Mishra R *et al.* [19] and less than (8.86) that of Baghel R *et al.* [20] study.

Analogous to our study, Choudhury *et al.* [21] study had also reported fracture as the most common diagnosis encountered in Orthopedics In-patient. NSAIDs were the most commonly prescribed drugs in our study, similar to Shehnaz *et al.* [22] study. Among the NSAIDs, paracetamol was the most prescribed NSAID, similar to that of Patil LV *et al.* [23] study. In the present study, we observed that gastroprotective agents Proton-pump inhibitors (PPIs) were co-administered with NSAIDs. The most commonly prescribed PPI was pantoprazole (84.03%) (table 4). The main reason for their use was NSAID-associated peptic ulcer and gastrointestinal bleeding [24]. In Rahman MS *et al.* study revealed that the proton pump inhibitors were used as the anti-ulcer agents of choice [25].

In our study, out of 144 patients, 26 of them also had other comorbidities and it was seen that Diabetes was the most common comorbidity just as Narne *et al.* [13] study. Again, when we compared the number of drugs per prescription given to patients, it was seen that in our study, a maximum of 45 patients were prescribed 3-4 drugs in contrast to Narne *et al.* [13] study, where 69 patients had 4-6 drugs.

The use of Fixed Dose Combinations (28.55%) was found to be much higher than that reported in the Shankar PR *et al.* (13.1%) study [18] but lower than that reported by Das *et al.* (36.25%) study [17]. Moreover, the use of parenteral preparations (43.90%) was found to be much higher than that reported in the Shankar PR *et al.* (8.6%) study [18] and Das *et al.* (17.4 %) study [17].

Most of the drug utilization studies have reported that the majority of the drugs were prescribed by brand names. Shankar PR *et al.* [18] study and Shankar PR *et al.* [26] study found 80.7% and 67.4% prescriptions in brand names, respectively, similar to our study (51.94%). Analogous to our study (48.06%), in Alam K *et al.* study (44%) too drugs were prescribed by generic names [27]. Generic drugs are usually inexpensive than brand drugs [22]. The percentage of drugs prescribed from the WHO essential drug list was 47.78% in contrast to Ingle *et al.* (51.05%) study [15].

LIMITATIONS

The limitations of our study were that the period of our study should have been longer so that we could have included more number of patients and analyzed their prescriptions to get better results and observations. We should have also included OPD patients to get the statistics about the average consultation and dispensing time of the drugs.

CONCLUSION

The study shows that a good percentage of drugs were prescribed from the essential drug list, but this practice has to be increased in future. Again, the average number of drugs per prescription was high, so the physicians must make the habit of reducing the number of drugs per prescription to avoid adverse drug reactions. Although a good number of drugs were prescribed by their generic names, it was less in comparison to that of brand drugs. Regular educational interventions at different levels further promote rational prescribing.

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CONFLICT OF INTERESTS

Declared none

REFERENCES

1. Jain S, Khan YZ, Upadhyaa P, Kumar A. Assessment of prescribing pattern in a private teaching hospital in India. Int J Pharm Sci. 2013 May 06;3(3):219-22.
2. Shaikh U, Chandra SN, Jayasree T, Shankar J, Kotipalli R. Prescription trends in department of orthopaedics at Tertiary Care Teaching Hospital. J Chem Pharm Res. 2013;5(11):512-7.
3. Ahmed M, Ali N, Rahman Ur Z, Khan Md M. A study on prescribing patterns in the management of arthritis in the department of orthopaedics. Pharm Lett. 2012;4(1):5-27.
4. World Health Organization. Essential medicines and health products. The pursuit of responsible use of medicines: sharing and learning from country experiences. World Health Organization. How to investigate drug use in health facilities: selected drug use indicators. Available from: http://apps.who.int/medicine docs/en/d/Js2289e/3.1.html [Last accessed on 17 Mar 2024]
5. Aberathna A, Morrissey H, Ball P, Zawahir S. Antibiotics utilization patterns and direct cost in an emergency treatment unit in Sri Lanka. Int J Curr Pharm Sci. 2019 Oct 12;11(6):119-22. doi: 10.22159/ijcpr.2019v11i6.36358.
6. Fulda TR, Lyles A, Pugh MC, Christensen DB. Current status of prospective drug utilization review. J Manag Care Pharm. 2004 Sep/Oct;10(5):433-41. doi: 10.18553/jmcp.2004.10.5.433, PMID 15369426.
7. SA, Rao RR, Yadunath PS. Assessment of prescribing pattern among orthopedic in-patients using who prescribing indicators. Asian J Pharm Clin Res. 2018;11(12). doi: 10.22159/ajpcr.2018.v11i12.28855.
8. Geneva: WHO Collaborating Centre for Drug Statistics Methodology. WHO Collaborating Centre for Drug Statistics Methodology (Norway). Guidelines for ATC classification and DDD assignment; 2002a.
9. Geneva: WHO collaborating centre for drug statistics methodology. WHO collaborating centre for drug statistics methodology (Norway). ATC index with DDDs; 2002b.
10. Jain NK, Akarte A, Deshmukh PT, Kannojia P, Garud N, Akash Y. Rationality of fixed-dose combinations: an Indian scenario. Pharm Res. 2009;1:158-68.
11. Dhivya K, Shiva SR, Mohammed Zulkarnane A, Gautam R. Drug utilization and prescribing pattern analysis in orthopaedic outpatient department of tertiary care Hospital. Asian J Pharm Clin Res. 2021 May 5;14(6):121-4. doi: 10.22159/ajpcr.2021v14i6.41474.
12. World Health Organization. Guidelines for ATC classification and DDD assignment. Geneva: WHO Collaborating Centre for Drug Statistics Methodology; 2013.
13. Narne HM, Dilshad S, Poojitha G, Nithya MHS, Sindhuri P, Fakruddin N. Evaluation of prescribing pattern in orthopedics department in a tertiary care hospital: a prospective observational study. IJRESM. 2021 Nov;4(11):118-20.
14. Malhotra S, Jain S, Aggarwal A, Pandhi P, Gupta M. Pattern of prescription of non-steroidal anti-inflammatory drugs in an

orthopaedic outpatient clinic of a North Indian Tertiary Care Hospital. Indian J Pharmacol. 2005 Nov 1;37(6):404-5. doi: 10.4103/0253-7613.19083.

15. Ingle P, Patil PH, lathi V. Study of rational prescribing and dispensing of prescriptions with non-steroidal anti-inflammatory drugs in orthopedic outpatient department. Asian J Pharm Clin Res. 2015 May 20;8(4):278-81.
16. Alshakka MA, Badullah WF, Alolayan SO, Mahmoud MA. Prescribing patterns of non-steroidal anti-inflammatory drugs (NSAIDs) at outpatient departments of four hospitals. Biomed Res. 2018 Oct 30;29(19):3643-7. doi: 10.4066/ biomedicalresearch.29-18-1072.
17. Das BP, Adhikari N, Garg M, Rauniar GP, Naga Rani MA. Utilization pattern of nonsteroidal anti-inflammatory drugs (NSAIDs) in orthopedic practice at a tertiary care hospital in eastern Nepal. J Nep Med Assoc. 2000 Jan;39:315-8.
18. Shankar PR, Pai R, Dubey AK, Upadhyay DK. Prescribing patterns in the orthopaedics outpatient department in a teaching hospital in Pokhara, western Nepal. Kathmandu Univ Med J (KUMJ). 2007 Jan-Mar;5(1):16-21. PMID 18603980.
19. Mishra R, Keshari SS. Prescription pattern of analgesics in outpatient department in a tertiary care teaching hospital in North India. Int J Basic Clin Pharmacol. 2017 Oct;6(10):ijbcp20174361. doi: 10.18203/2319-2003.ijbcp20174361.
20. Baghel R, Adwal SK, Singh V, Chourishi A. Prescribing pattern and drug utilization study in inpatients of the department of orthopaedics in a rural teaching hospital of Ujjain, Madhya Pradesh, India. Int J Basic Clin Pharmacol. 2018 Sep;7(9):ijbcp20183486. doi: 10.18203/2319-2003.ijbcp20183486.
21. Choudhury DK, Bezbaruah BK. Prescribing pattern of analgesics in orthopedic in-patient department at tertiary care hospital in Guwahati, Assam, Northeast India. Indian J Pharmacol. 2016 Jul-Aug;48(4):377-81. doi: 10.4103/0253-7613.186207, PMID 27756947.
22. Shehnaz SI, Arifulla M, Sreedharan J, Sam KG. Prescribing patterns in the orthopedics outpatient department in GMC Hospital, Ajman, United Arab Emirates. GMJ. 2014;3Suppl 2:S120-31.
23. Patil LV, Nara M. A prospective observational study of the prescription pattern of drugs used in the treatment of osteoarthritis in a tertiary care hospital. Int J Basic Clin Pharmacol. 2017 Jan;6(1):ijbcp20164757. doi: 10.18203/2319-2003.ijbcp20164757. doi: 10.18203/2319-2003.ijbcp20164757.
24. Lapane KL, Spooner JJ, Mucha L, Straus WL. Effect of nonsteroidal anti-inflammatory drug use on the rate of gastrointestinal hospitalizations among people living in long-term care. J Am Geriatr Soc. 2001 May;49(5):577-84. doi: 10.1046/j.1532-5415.2001.49117.x, PMID 11380750.
25. Rahman MS, Zinnat AB, Samad MK. Prescribing pattern of nonsteroidal anti-inflammatory drugs at outpatient departments of teaching hospital. Bangladesh J Pharmacol. 2007 Jun;2:1-6. doi: 10.3329/bjp.v2i1.493.
26. Shankar PR, Partha P, Nagesh S. Prescribing patterns in medical outpatients. Int J Clinical Practice. 2002;56(7):549-51. doi: 10.1111/j.1742-1241.2002.tb11317.x.
27. Alam K, Mishra P, Prabhu M, Shankar PR, Palaian S, Bhandari RB. A study on rational drug prescribing and dispensing in outpatients in a tertiary care teaching hospital of Western Nepal. Kathmandu Univ Med J (KUMJ). 2006 Oct;4(4):436-43. PMID 18603950.