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PHARMACOEPIDEMOLOGICAL AND PHARMACOECONOMICAL STUDY OF ANALGESICS IN TERTIARY CARE HOSPITAL: RATIONAL USE

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ABSTRACT

Background-Analgesics are the most commonly used among drugs in the prescriptions in surgery, general medicine and out-patient department. Certain analgesics are also available directly to the patients without prescription as OTC. These scenarios are often leading to conditions of poly-pharmacy and drug-drug interactions, which in-turn leads to increased costs on patient care. **Objectives:** To study pharmaco-epidemiological and pharmaco-economical status of analgesics in tertiary care hospital. To study the rational use and educate patients about the chronic use of analgesics. **Methodology:** This is a prospective observational study in evaluating the Pharmaco-epidemiological and Pharmaco-economical status and rational use of analgesics at a tertiary care hospital. **Results:** A total of 220 subjects were analysed who have been prescribed with analgesics. Out of these, 181 subjects were enrolled based on inclusion and exclusion criteria, which includes in patients of selected departments. The percentage of non-opioids drug use was found to be more compared to opioid drugs which was 72.69% respectively. It was found that most frequently prescribed analgesic was Inj. Diclofenac while economically most cost benefit drug was found to be Inj. PCM. Inj. Diclofenac was prescribed 7.37 times more than Inj. PCM. **Conclusion-**The study showed that analgesics administration was found to be more in males compared when compared with female subjects. Basedon broad classification of analgesics as opiates and non-opiates, the prescribed drugs were grouped. The data was recorded and analyzed. It was observed that 72.69% of non-opioid drugs were used in over all 181 case profiles.

KEYWORDS: Analgesics, NSAID's, opioids, pharmacoeconomics, pharmacoepidemiology.

INTRODUCTION

Pain is the body's mechanism of self-preservation. Its acts as a warning to indicate that harm or damage is being done to a tissue or organ of our body. Scientific characterization of has been initiated by the definition of Sherrington as "psychical adjunct of an imperative, protective reflex".[1] Latest definition of pain by International Association for the Study of Pain (IASP) is "an unpleasant sensory and emotional experience associated with actual or potential tissue damage".[2] Suffering is the emotional component of pain. Pain is similar to everyone and yet it is so complex and subjective that it cannot be easily described or treated.

Analgesics are the class of drugs that are known to relieve pain by altering sensory perception or affecting consciousness. These are classified further into two types, namely Non-steroidal anti-inflammatory drugs (NSAID's) and opioids.[3] NSAID's are known to act by inhibiting cyclooxygenase (COX) and are the first-line medications for mild to moderate pain. Opioids action depend upon the type of opioid receptors (delta, kappa and mu receptors) they act at. They may either act as agonists, partial agonists or antagonists at these receptors. Opioids are classified according to their mode of synthesis like naturally occurring (eg- Morphine, Codeine), semi-synthetic (eg- Diamorphine, Buprenorphine etc) and synthetic (eg- Fentanyl, Pethidine, Methadone etc).[4]

Pharmacoepidemiology is defined as applying epidemiological methods to effects of medicines, like biological treatments or vaccines usually in larger populations.[5] It combines both clinical pharmacology and epidemiology. Pharmacology is the study of medication effects on humans using both pharmacokinetic (PK) and pharmacodynamics (PD) parameters of the individuals. Whereas epidemiology is the study of factors determining the occurrence and distribution of diseases in a population.[6] On the other hand, pharmacoeconomics involves the measuring, identification and comparison of one pharmaceutical drug or drug therapy with another with respect to the cost and consequences to the society and healthcare systems.[7] It includes various methods like cost minimization analysis, cost utility analysis, cost effectiveness analysis, cost benefit analysis.[8] Our study aimed at evaluating pharmacoepidemiological and pharacoeconomical status of analgesics and also to evaluate its rational use at a tertiary care hospital.

MATERIALS AND METHODS

STUDYDESIGN

The study structure is carried out by Prospective and Observational Studies, to study the "Pharmaco-epidemiological and pharmaco-economical study of Analgesics in a Tertiary Care Hospital".

STUDY SITE

The data collection for this research would be done atMalla Reddy Narayana Multispeciality Hospital, Suraram.

STUDYPERIOD

The study period is carried out in the year 2018-2019.

SAMPLE SIZE

A totalof 220 subjects were analysed who have been prescribed with analgesics. Of these 181 subjects were enrolled based on inclusion and exclusion criteria, which includes in patients of selected departments.

Study criteria

Inclusion criteria

- ✓ Casualty department
- ✓ Orthopaedic department
- ✓ Gynecology
- ✓ Surgery ward.

Exclusion criteria

- ✓ Paediatric ward
- ✓ Unwilling Patients.

Study Material: All relevant and necessary data for this study was collected from:

- ✓ Patient case notes
- ✓ Treatment charts
- ✓ Laboratory reports
- ✓ Interviewing patient/patient care taker
- ✓ Interviewing health care professionals

Study Procedure

A prospective and cross sectional study was carried out in the selected wards of hospital. The patients prescribed with analgesics were identified during ward rounds and by regular case record reviews during study period.

The enrolled patients were taken follow-up from the day of admission till the day of discharge and relevant study data including laboratory investigations, past medical history and medical history interview were documented in case record form.

The data observed was analysed for the Pharmacoepidemiological and Pharmacoeconomical study of analgesics. The subjects enrolled for the study were prescribed with analgesics and their eligibility to enrol was based thoroughly on the inclusion and exclusion criteria.

RESULTS

1. GENDER

During this study, 220 case profiles were reviewed, of which 181 cases were enrolled as study subjects, based on inclusion and exclusion criteria.

Table 1: Gender-wise grouping of enrolled subjects in different departments.

Gender	Number of patients	Percentage
MALE	**105**	**58.01**
FEMALE	**76**	**41.98**

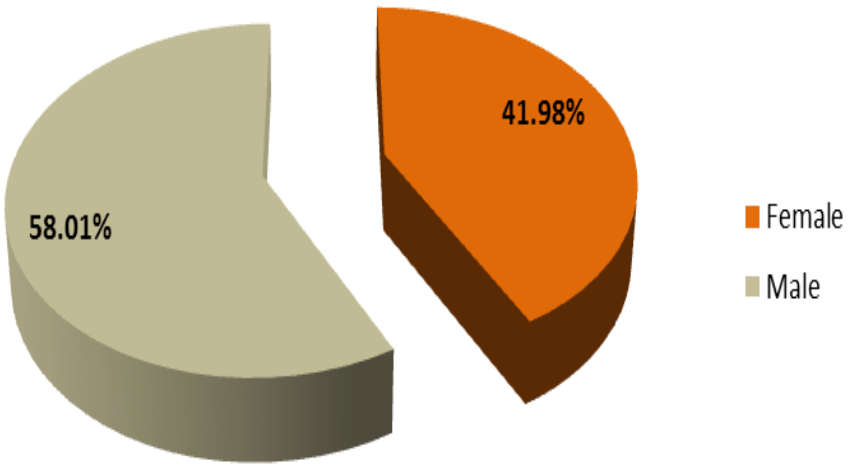

Figure 1: Pictorial representation of Gender-wise grouping of subjects enrolled in different departments.

Gender-wise grouping in individual departments

➢ **1.1 Orthopedic Ward**

A total number of 60 case profiles were reviewed in Orthopedic department, of which 52 cases were enrolled for the study.

Table 2: Gender-wise grouping of subjects in orthopedic ward.

Gender	No. of Subjects	Percentage
Male	**37**	**71.15**
Female	**15**	**28.84**

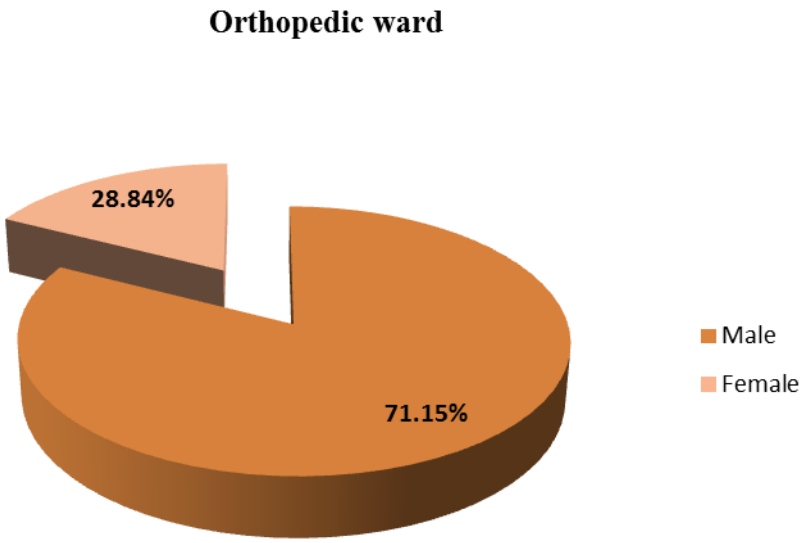

Figure 2: Pictorial representation of Gender-wise grouping of subjects in orthopedic ward.

➢ **1.2 Surgery ward**

A total number of 60 case profiles were reviewed in Surgery department, of which 50 cases were enrolled for the study.

Table 3: Gender-wise grouping of subjects in surgery ward.

Gender	No. of patients	Percentage
Male	35	70%
Female	15	30%

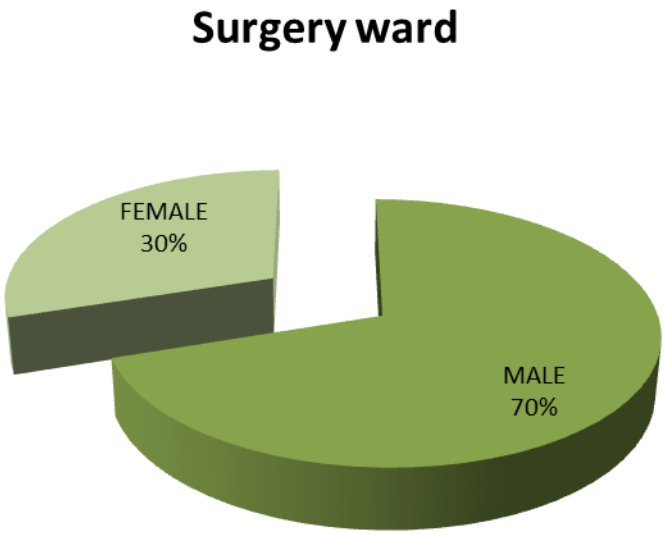

Figure 3: Pictorial representation of Gender-wise grouping of subjects surgery ward.

- **1.3 Casualty Ward**

A total number of 50 case profiles were reviewed in Casualty ward, of which 40 were enrolled as subject for the study.

Table 4: Gender-wise grouping of subjects in casualty ward.

Gender	No. of subjects	Percentage
Male	33	82.5
Female	7	17.5

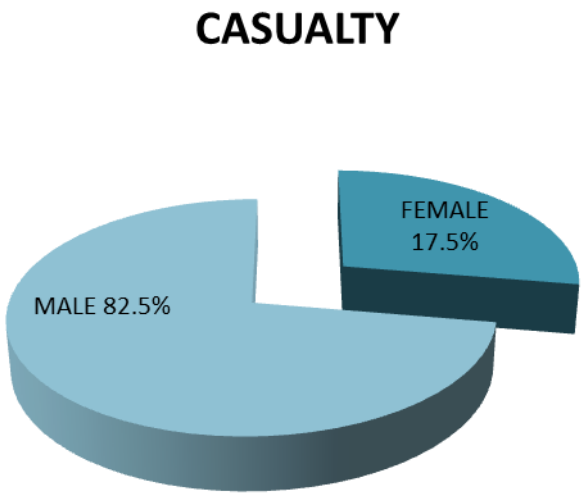

Figure 4: Pictorial representation of Gender-wise grouping of subjects in casualty ward.

➢ **1.4 Gynecology Ward**

A total of 50 case profiles were reviewed, of which 39 cases were enrolled as study subjects from gynecology ward.

2. AGE GROUP

The enrolled 181 subjects were reviewed based on age and were grouped into different age groups with class size of 10. The maximum number of subjects enrolled belonged to age group of 31-40, with mean age group of 40.3 years.

Table 5: Age-wise grouping of enrolled subjects.

Age group	Number of subjects	Percentage
11.-20	18	9.94
21-30	38	20.99
31-40	43	23.75
41-50	30	16.57
51-60	31	17.12
61-70	15	8.28
71-80	6	3.31

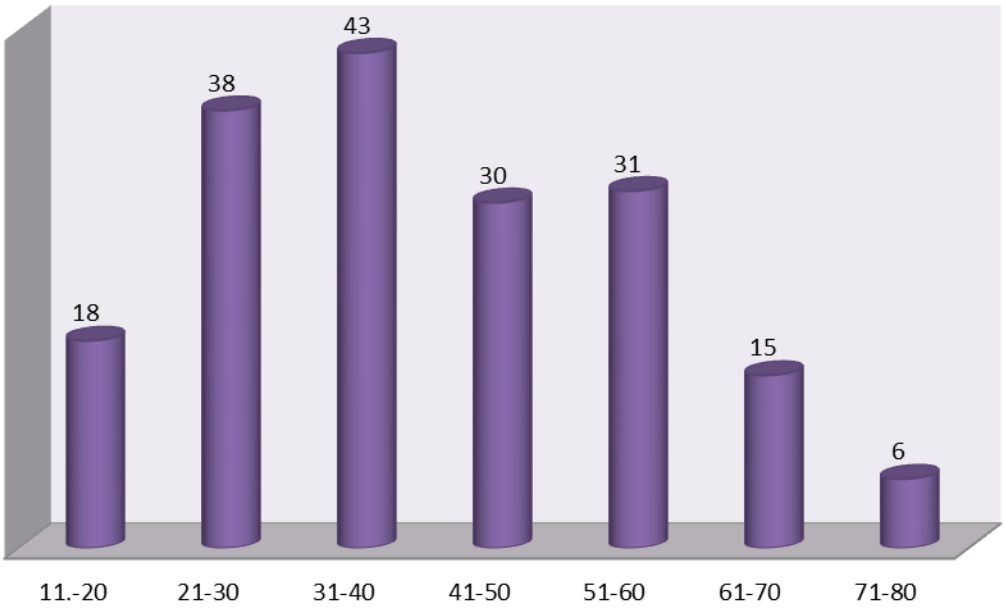

Figure 5: Graphical representation of age-wise grouping of enrolled subjects.

3. SOCIAL HISTORY

Based on social habits, the enrolled subjects were grouped and the data was analysed.

Table 6: Grouping of subjects based on social habits.

Social habit	No.of Subjects	Percentage
Alcoholic	11	6.07
Alcoholic and smoker	8	4.41
Smoker	3	1.65
Occasional alcoholic and smoker	10	5.52
Toddy	3	1.65
Tobacco	1	0.55
Caffeine	68	37.56
None	77	42.54

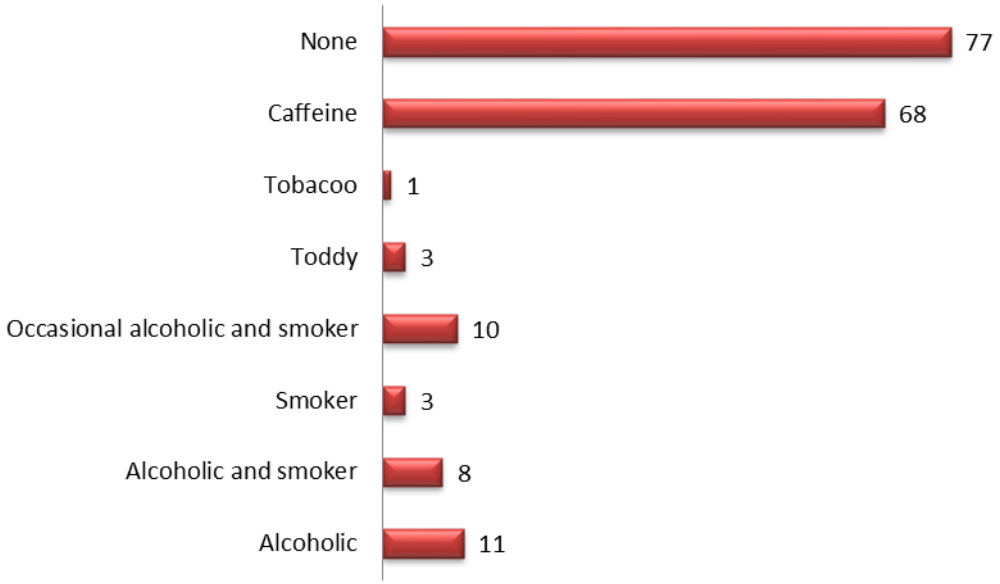

Figure 6: graphical representation of enrolled subjects according to their social habits.

4. ROUTE OF ADMINISTRATION

Based on route of administration prescribed the enrolled subjects were grouped and the data was analyzed. It was observed that oral administration had higher prescriptions than other routes of analgesic administrations.

Table 7: Grouping of subjects based on route of analgesic administration.

Route of Administration	No. of Prescriptions	Percentage
Intra- Muscular	81	29.88
Intra- Venous	75	27.67
Slow Iv	2	0.73
Oral	113	41.69

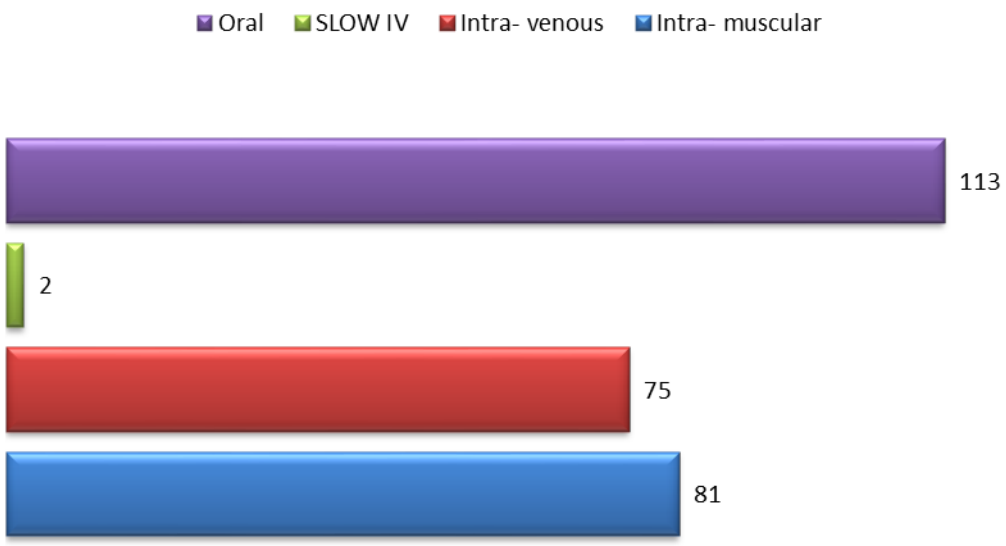

Figure 7: Graphical representation of various routes of administration prescribed for analgesics in the enrolled subjects.

5. Parenteral Analgesics

Prescriptions of enrolled subjects were examined for parenteral analgesics. The data was recorded and analysed. Among various parenteral analgesics prescribed it was observed dicloenac was most commonly prescribed analgesics.

Table 8: various parenteral analgesics prescribed in the enrolled subjects.

Analgesic	No. of Prescriptions	Percentage
Diclofenac	96	60.75
Tramadol	47	29.74
Acetaminophen	8	5.06
Ketorolac	3	1.89
Fentanyl	1	0.66
Ibuprofen	3	1.89

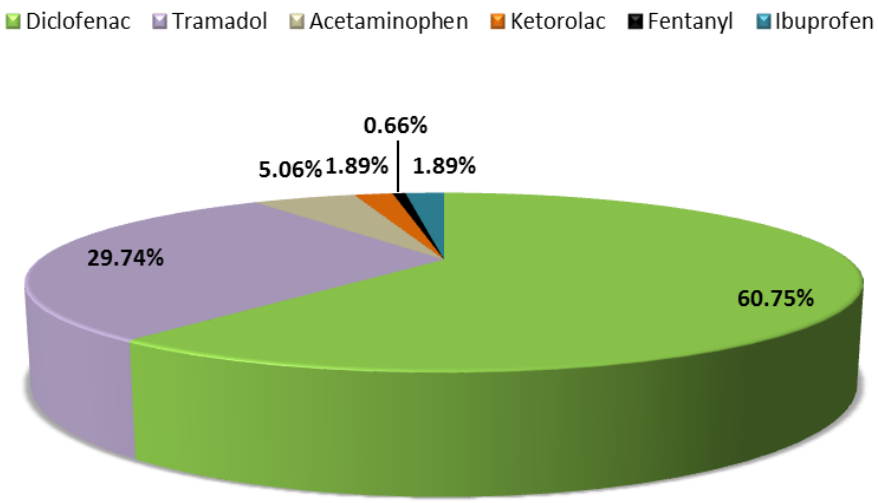

Figure 8: Graphical representation of parenteral analgesics prescribed.

6. Oral analgesics

Prescriptions of enrolled subjects were examined for oral analgesics. The data was recorded and analysed. Among various oral analgesics prescribed it was observed diclofenac was most commonly prescribed analgesics.

Table 9: Various oral analgesics prescribed in the enrolled subjects.

Drugs	No. of Prescriptions	Percentage
Chymoral Forte	2	1.76
Paracetamol	34	30.08
Aceclofenac	8	7.07
Diclofenac+Serratiopeptidase	7	6.19
Serratiopeptidase	1	0.88
Aspirin	1	0.88
Tramadol+Acetaminophen	20	17.69
Aceclofenac+Acetaminophen	6	5.3
Ibuprofen	3	2.65
Diclofenac	16	14.15
Gabapentin	1	0.88
Ketorolac	1	0.88
Mefenamic Acid	3	2.65
Piroxicam	1	0.88
Tramadol	6	5.3
Naproxen	2	1.76
Naproxen + Domperidone	1	0.88
Total	113	

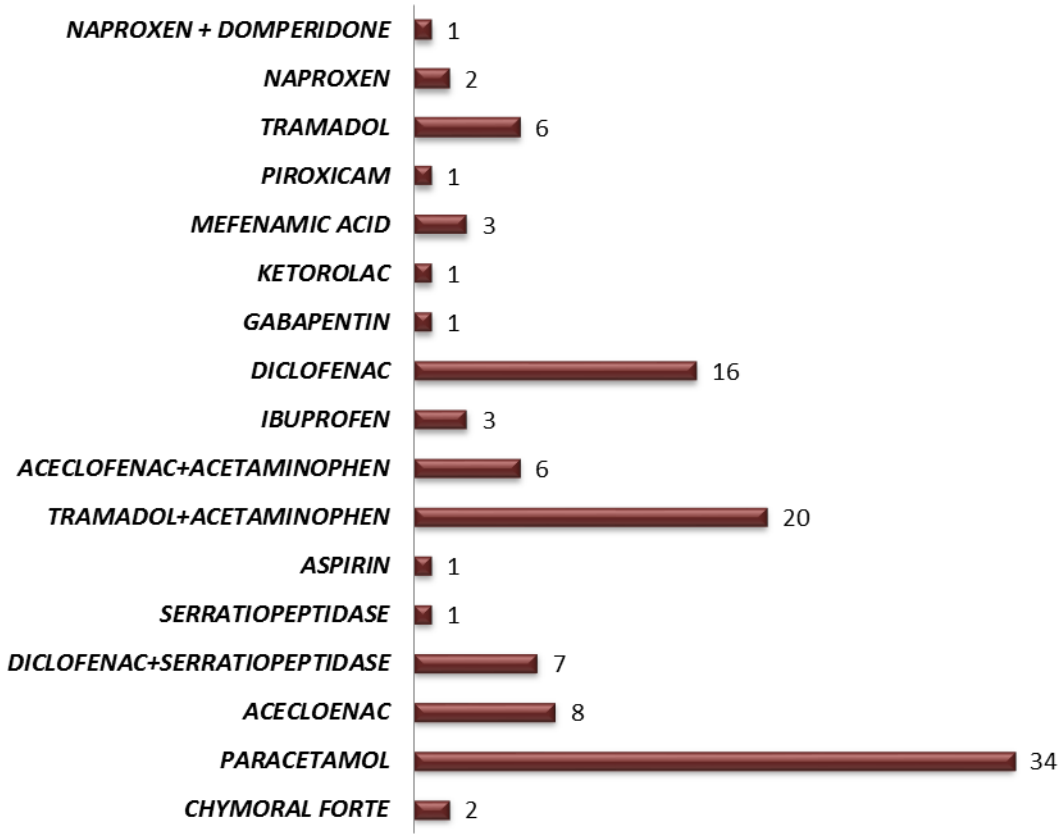

Figure 9: Graphical representation of various oral analgesics prescribed.

7. Comparison Of Opioids And Non Opioid Analgesics

Basedon broad classification of analgesics as opiates and non-opiates, the prescribed drugs were grouped. The data was recorded and analyzed.

Non Opioids	No. of Prescriptions		Opiods	No. Of Prescriptions
Piroxicam	1		Fentanyl	1
Naproxen	3		Tramadol	53
Diclofenac	119		Tramadol+Acetaminophen	20
Aceclofenac	8			
Acetaminophen	42			
Gabapentin	1			
Aspirin	1			
Aceclofenac+Acetaminophen	6			
Ibuprofen	6			
Ketorolac	4			
Mefenamic Acid	3			
Chymoralforte	2			
TOTAL	**197**		**TOTAL**	**74**

Table 10: Comparison between opioid and non-opioid analgesic.

Type of Analgesic	Number of prescriptions	Percentage
Opioids	74	27.30
Non-Opioids	197	72.69

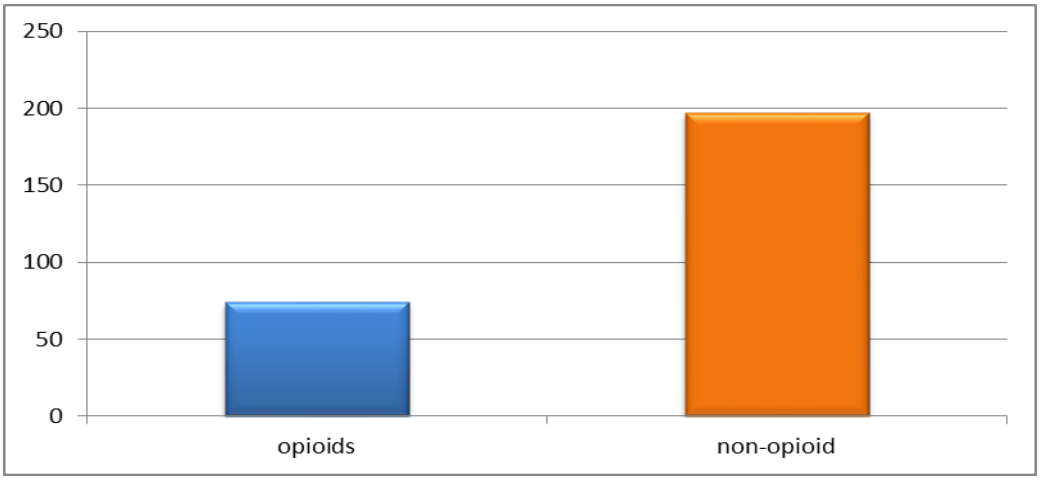

Figure 10: Graphical representation for opioid vs. non-opioid analgesics prescribed.

8. Comparison of Oral vs. Parenteral drugs

The drugs common in oral and parenteral route of administration were choose and compared.

Table 11: Oral vs. Parenteral analgesics prescribed.

Analgesic	Oral	Parenteral
Diclofenac	23	96
Tramadol	26	47
Acetaminophen	40	8
Ketorolac	1	3
Ibuprofen	3	3

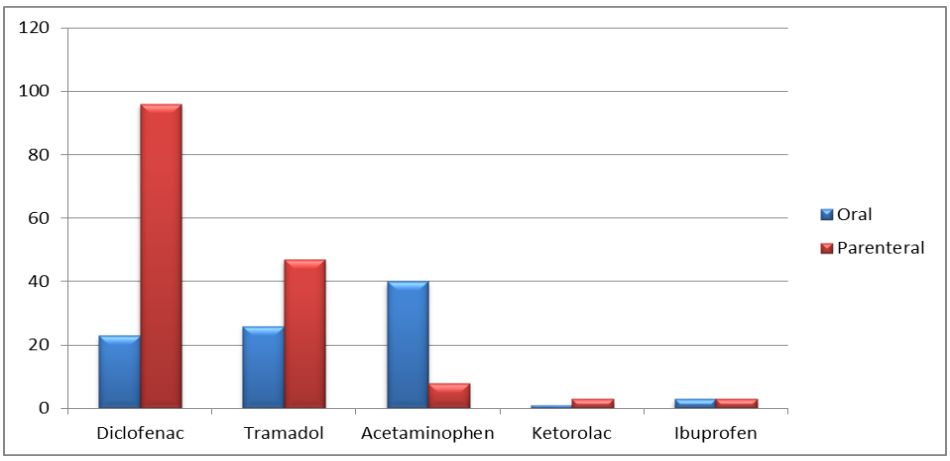

Figure 11: Oral vs. Parenteral analgesics prescribed.

9.Drug Utilization And Cost Effective Analysis

9.1 Parenteral Administration

It was found that most frequently prescribed analgesic was INJ. DICLOFENAC while economicaly most cost benfit drug was found to be INJ.PCM. INJ. DICLOFENAC was prescribed 7.37 times more than INJ.PCM.

Table 12: cost effective analysis and drug utilization of analgesics in parental administration.

Prescribed Drug	Price(In Rupees/-)	Percentage Of Drug Used
Inj.Pcm	6.5	5.06
Inj.Ibuprohen	10	1.89
Inj.Tramadol	13	29.74
Inj.Justin	15	0.63
Inj.Ketorol	18	1.89
Inj.Piroxicam	20	0.63
Inj.Diclofenac	21	37.34
Inj.Dynapar-Aq	21	9.49
Inj.Ketoralac	24	1.89
Inj.Voveron	25	13.29
Inj.Fentanyl	39.8	0.63

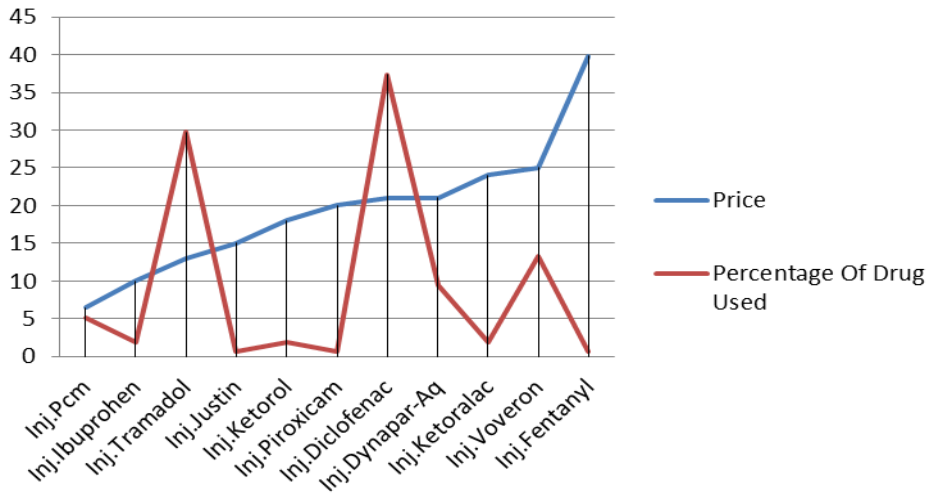

Figure 12. graphical representation of cost effective analysis and drug utilization of analgesics in parental administration.

9.2 Oral Administration

It was found that most frequently prescribed analgesic was PARACETAMOL whileeconomicaly most cost benfit drug was found to be ASPIRIN. TAB PARACETAMOL was prescribed 19.2 times more than TAB ASPIRIN.

Table 13: cost effective analysis and drug utilization of analgesics in oral administration.

PRESCRIBED DRUG	PRICE(In Rupees/-)	PERCENTAGE
T.ASPIRIN	0.6	0.89
T.PARACETAMOL	1	17.64
T. IBUPROFEN	1	2.67
T.PCM	1	0.89
T.COMBIFLAM	1.5	1.78
T.NAPROXEN	1.6	1.78
T.DOLO	2	9.07
T.ACECLOFENAC	2	7.14
T.ACECLO P	2	0.89
T.MEFTHAL SPAS	3	2.67
T.HIFENAC P	4	4.46
T.VOVERON	4	9.22
T.KETOROL	5	0.89
T.NAPRODON	5	0.89
T.TRAMADOL	5	5.31
T.DICLOFENAC	6	3.54
T.GABAPENTIN	7	0.89
T.PIROXICAM	8	0.89
T.ULTRACET	11.2	17.8
T.CHYMORAL FORTE	17.5	1.78
T.EMAZEN D	144.6	8.02
T.EMAZEN	92	0.89

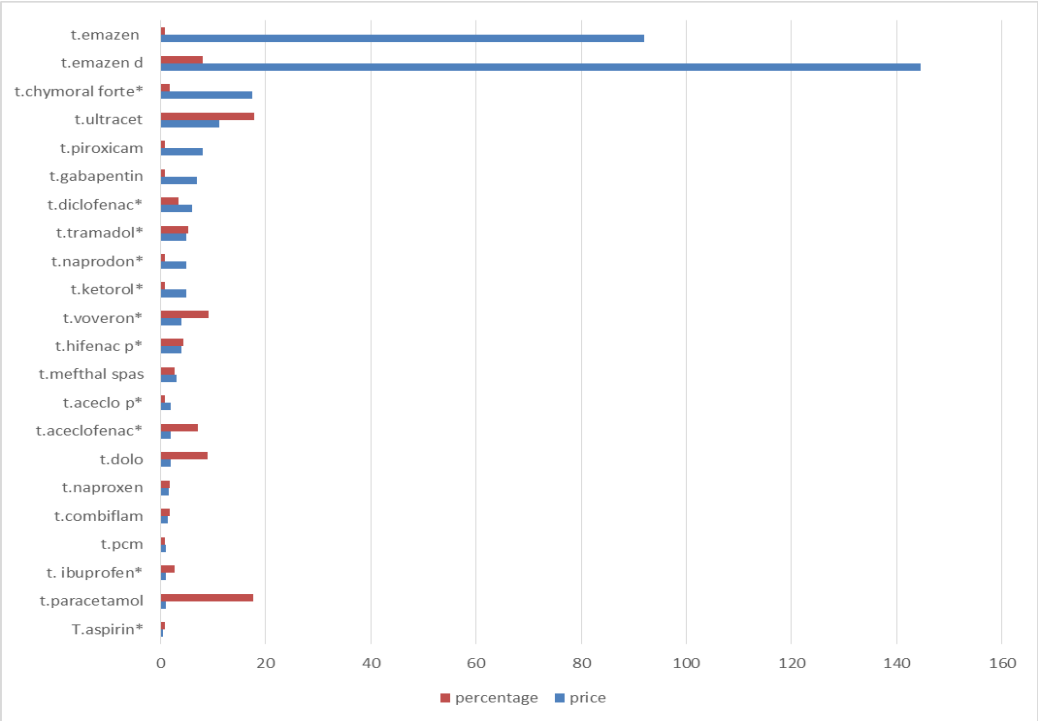

FIgure 13: graphical representation of cost effective analysis and drug utilization of analgesics in parental administration.

DISCUSSION

A prospective and cross sectional study was carried out in the surgery, orthopaedic, gynaecology and causality departments of the hospital. The patients prescribed with analgesics were identified during ward rounds and by regular case record reviews during study period.

The enrolled patients were taken follow-up from the day of admission till the day of discharge and relevant study data including laboratory investigations, past medical history and medical history interview were documented in case record form.

The data observed was analysed for the Pharmacoepidemiological and Pharmacoeconomical study of analgesics. The subjects enrolled for the study were prescribed with analgesics and their eligibility to enrol was based thoroughly on the inclusion and exclusion criteria.

This survey shows a high use of analgesics in hospitals, but adherence of analgesic use to the principles and recommendations of the guidelines for pain management was low, as shown by the fact that less than one third of all analgesic treatments was considered appropriate adherence.

A total of 220 subjects were analysed who have been prescribed with analgesics. Of these 181 subjects were enrolled based on inclusion and exclusion criteria.

In the prescribed analgesics it was seen that NSAID usage is more than opioids.

It is seen that in revised 181 subjects males are given with more analgesics than females. Males shows an increase percentage in usage of analgesics i.e. 58.01% and females usage was found to be 41.09%.

In orthopaedic ward, it is seen that males shown a percentage of 71.15 and females show 28.84.

In surgery ward males showed a percentage of 70% and females showed 30% usage, where as in causality ward male showed 82.5% and females showed 17.5%.

It was observed that middle age group and alcohol consuming patients are more prone to use analgesics.

According to the observed results the most commonly used route of administration for analgesics is the oral route and intramuscular route with a percentage of 41.69 and 29.88 respectively, followed by intravenous and slow intravenous.

Among prescribed analgesics it was seen that in parenteral route of administration diclofenac shows an increased usage with 60.75% followed by tramadol (29.74%), acetaminophen (5.06%), ketorolac (1.89%), ibuprofen (1.89%) and fentanyl (0.66%).

In oral analgesics the most commonly used were found to be paracetamol with 30.08% followed by tramadol+acetaminophen with 17.69% was similar to previous studies in our milieu and once again showed the scarcity of treatment with opioid analgesics, rescue analgesia, PCA schedule or regional analgesia in clinical wards (but not in critical care or reanimation units, which were excluded from the survey), which are well-assessed and valuable tools in pain management. These figures confirm the scarcity of opioid use in our country shown by previous studies, which were in contrast with the figures of other countries regarding, for instance, cancer pain, as a consequence of interdisciplinary work, acute-pain teams or local guidelines. In addition, low doses of analgesics, mainly opioids, were prescribed and administered, similar to the classical study by Marks and Sachar. This seems to be related to fears of side effects, and probably reflects physicians' and nurses' negative attitudes towards the use of opioids due to the worries about the risk of possible addiction.

Diclofenac (1amp) + Ultracet (1tab) was the most effective therapy with lower cost per patient (RS.32.20/-). This service is cost effective, costing on average of RS.64.40/- per patient per day. Incremental analysis indicated that Diclofenac (1amp) + Ultracet (1tab) + Injection PCM involved the additional cost of RS.38.20/- in case an extra effectiveness benefit was needed. The analysis showed that the most suitable choice of analgesic therapy should consider the resources available at the institution along with economic and clinical aspects.

CONCLUSION

This prospective study revealed that most common used analgesic is Diclofenac which was frequently employed at a dose range of 50 to 75mg. The study concluded that parenteral non opioids are mostly preffered by the physicians.

It was observed that 72.69% of non opioid drugs were used in over all 181 case profiles.

The study showed that analgeics administration was found to be more in males compared with females subjects.

In the study administration of analgesics was observed to be more in age group of 31-40 years.

REFERENCES

1. Sherrington C. The integrative action of the nervous system. 2nd ed. Cambridge University Press, 1952.
2. International Assoaciation for the study of pain. IASP's proposed new definition of pain released for comment.
3. Floyd E. Bloom. Analgesic. Available from: ttps://www.britannica.com/science/analgesic.
4. Pathan H, Williams J. Basic opioid pharmacology an update. British journal of pain, 2012; 6(1): 11-16.
5. Evans SJ. An agenda for UK clinical pharmacology: pharmacoepidemiology. British journal of clinical pharmacology, 2012; 73(6): 973-978.
6. Gordis L. Epidemiology. 4th ed. Philadelphia, PA: Saunders; 2009.
7. Kumar S, Baldi A. Pharmacoeconomics: principles, methods and economic evaluation of drug therapies. Ph. Tech. Med, 2013; 2(5): 362-369.
8. Jayanthi MK, Sushma NV. Drug utilization pattern and pharmacoeconomic study in paediatric dentistry at a tertiary hospital. Int J Pharm Sci, 2014; 6(2): 70-72.