Drug utilization pattern of analgesics among post-operative patients in a tertiary care hospital: A prospectve study

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Abstract
Objectives: To evaluate the pattern of analgesic prescription in post-operative pain management and the preferred analgesics based on assessment of pain in post-operative patients.
Materials and Methods: A prospective observational study was done by analysing the case records of patients who underwent surgery in the departments of Orthopaedics, General Surgery and Obstetrics & Gynecology. The evaluation of postoperative pain was done at fixed time intervals according to Visual analog scale (VAS) to evaluate the preferred analgesic pattern. ANOVA was the test of significance to identify the mean difference.
Results: The use of conventional NSAIDs like Diclofenac (48%) and Paracetamol (29.6%) was seen more in the present study. All the patients were prescribed with injectable analgesics on the day of surgery (Day 0) and also on 1st post-operative day (day1). Mean pain scores measured at 2 hours and 6 hours were significantly higher in Group A compared to Group B and C. The maximum reduction in the mean pain scores was seen in group C at 2 hrs and group B at 6 hrs respectively. The difference in the mean pain scores in group B and group C was not significant at 2 and 6 hrs post-operatively.
Conclusion: The post operative cases can be managed with conventional NSAIDs and non NSAIDs like Tramadol to little extent. The prescription of drugs in brand name could be changed to Generic name. There is scope for improvement of rational prescribing by introducing appropriate educational interventions.

Keywords: Drug utilization pattern, Analgesics, Post-operative pain, Visual analog scale.

Introduction
The world health organization (WHO) has defined drug utilization as the "marketing, distribution, prescription and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences."[1] For the individual patient, the rational use of a drug implies the prescription of a well documented drug at an optimal dose, together with the correct information, at an affordable price.

Pain is an unpleasant sensation occurring in varying degrees of severity as a consequence of injury, disease, or emotional disorder.[2] "Pain is always subjective".[3,4] Acute painful disorders are treated instantly; on the other hand severe post-operative pain and severe visceral pain are under diagnosed and undertreated.

Poor pain control is not only unethical but also leads to psychological and economical burden.[5] Effective post-operative pain control is an essential component of the care of the surgical patient. Inadequate pain control, apart from being inhumane, may result in increased morbidity or mortality.[6,7]

Market is flooded with variety of analgesics which may lead to the problem of irrational prescription.[8] There is always scope for continuous research to identify more effective and safer drug utilization pattern of analgesics among post-operative patients. Hence this study was designed to evaluate the drug utilization pattern of analgesic among post-operative patients in a rural tertiary care teaching hospital.

Material and Methods
This prospective, observational study was conducted at Sri Adichunchanagiri Hospital & Research Centre, B.G Nagara, Nagamangala from June 2016 to May 2017. Data was collected from the case-records of the in-patients admitted for undergoing any surgical procedure in the departments of Orthopedics, General Surgery and Obstetrics & Gynecology.

Ethical clearance was obtained from the Institutional Ethical Committee. Patients aged >18 years who underwent operative procedure in departments of Orthopedics, General Surgery and Obstetrics & Gynecology and who were willing to participate in the study were included after informed consent was taken in a pre-designed consent form.

The data regarding analgesics prescribed during day 0, 1st, 2nd & 3rd post-operative days, their dose, route of administration, mono/combined therapy were collected from case sheets.

Table 1: Analgesics prescribed

	Drugs	Dose	Route of administration	Frequency
Operative day (Day O)				
First post-operative day (Day 1)				
Second post-operative day (Day 2)				
Third post-operative day (Day 3)				

Post-operative period

To study the preferred analgesic pattern based on Visual Analog Scale (VAS), patients treated with single drug (monotherapy) on the day of surgery (Day 0), either Paracetamol intravenous infusion, Diclofenac intravenous as a bolus or intramuscular or Tramadol intravenous infusion or intramuscular route were divided into three groups - Group A, Group B and Group C respectively. Assessment of pain was done by using Visual Analogue Scale (VAS). The time of arrival in the postoperative ward was defined as zero hour postoperatively and the scores were recorded at 0 hrs, 2 hrs, 6 hrs and 12 hrs of the post-operative period with the help of a post-graduate from the department of Anaesthesia to obtain the preferred analgesic pattern.

Table 2: Pain scoring: Visual analogue score on a scale of 10.
(0: No pain, 10: Maximum pain)

Score	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Time											
0 hr											
2 hr											
6 hr											
12 hr											

Table 3: Grouping of patients

Post operative assessment time	**Group A (Paracetamol)**	**Group B (Diclofenac)**	**Group C (Tramadol)**
0hr			
2 hrs			
6 hrs			
12 hrs			

Results

328 patients were selected from the post-operative wards of Orthopedics (116, 35.4%), General Surgery (100, 30.5%) and Obstetrics & Gynaecology departments (112, 34.1%).

All the patients were prescribed with injectable analgesics (Parenteral) on the day of surgery (Day O) and also on 1st post-operative day (day1). Diclofenac was the most commonly prescribed among the injectable analgesics (48.0%), followed by Paracetamol (29.6%), Tramadol (17.6%) and Pentazocin (4.8%).

Table 4: Pattern of analgesic usage on the day of surgery (Day 0)

Drugs	**Route of administration**		**Total**	**Percentage (%)**
	Oral	**Parenteral**		
Paracetamol	-	117	117	29.6
Diclofenac	-	189	189	48.0
Tramadol	-	69	69	17.6
Pentazocin	-	19	19	4.8
Aceclofenac	-	-	-	-
Aceclofenac + Paracetamol	-	-	-	-
Tramodol + paracetamol	-	-	-	-
Diclofenac + Paracetamol	-	-	-	-
Total	**-**	**394**	**394**	**100**

Table 5: Pattern of analgesic usage on 1st post-operative day (Day 1)

Drugs	**Route of administration**		**Total**	**Percentage (%)**
	Oral	**Parenteral**		
Paracetamol	-	109	109	27.8
Diclofenac	-	205	205	52.3
Tramadol	-	65	65	16.6
Pentazocin	-	13	13	3.3
Aceclofenac	-	-	-	-
Aceclofenac + Paracetamol	-	-	-	-
Tramodol + paracetamol	-	-	-	-
Diclofenac + Paracetamol	-	-	-	-
Total	**-**	**392**	**392**	**100**

Total of 167 (47.7%) patients were prescribed with different oral analgesics on 2nd post-operative day (Day 2). Combination of Aceclofenac + Paracetamol (38.37%) was the commonly prescribed oral analgesic followed by Paracetamol as a single

drug and Tramadol + Paracetamol (33.94%) combination. The least prescribed oral analgesic was combination of Diclofenac + Paracetamol (5.81%)

Table 6: Pattern of analgesic usage on 2nd post-operative day (Day 2)

Drugs	Route of administration		Total	Percentage (%)
	Oral	Parenteral		
Paracetamol	40	54	94	26.9
Diclofenac	-	89	89	25.4
Tramadol	-	33	33	9.5
Pentazocin	-	7	7	2.0
Aceclofenac	12	-	12	3.4
Aceclofenac + Paracetamol	67	-	67	19.1
Tramodol + paracetamol	32	-	32	9.75
Diclofenac + Paracetamol	16	-	16	9.2
Total	**167**	**183**	**350**	**100**

On 3rd post-operative day (Day 3), number of patients prescribed with different oral analgesics has increased to 281 (82.9%). Combination of Aceclofenac + Paracetamol (38.37%) was again the commonly prescribed oral analgesic followed by Paracetamol as a single drug and Tramadol + Paracetamol (33.94%) combination. The least prescribed oral analgesic was combination of Diclofenac & Paracetamol (5.81%).

Table 7: Pattern of analgesic usage on 3rd post-operative day (Day 3)

Drugs	Route of administration		Total	Percentage (%)
	Oral	Parenteral		
Paracetamol	83	6	89	26.6
Diclofenac	5	39	44	13.0
Tramadol	-	12	12	3.5
Pentazocin	-	1	1	0.2
Aceclofenac	14	-	14	4.1
Aceclofenac + Paracetamol	117	-	117	34.5
Tramodol + Paracetamol	44	-	44	13.0
Diclofenac + Paracetamol	18	-	18	5.3
Total	**281**	**58**	**339**	**100**

On the day of surgery monotherapy was prescribed for 66 (20.1%) patients and 262 (79.9%) patients received combination therapy (figure 3). On 1st, 2nd and 3rd post-operative days monotherapy usage was increased up to 58 percent.
When considering the mode of prescribing of analgesics, the percentages of analgesics prescribed in generic names in the hospital were 39 (11.9%) which was low compared to the analgesics prescribed with trade name 289 (88.1%).

Table 8: Pattern of analgesic usage regarding route of administration

Post-operative period	Oral	Parenteral
Day 0	0	394
Day 1	0	392
Day 2	167	183
Day 3	281	58

Table 9: Monotherapy or combined therapy

Analgesics	Day 0		Day 1		Day 2		Day 3	
	No. of patients	%	No. of patients	%	No. of patients	%	No. of patients	%
Monotherapy	66	20.1	64	19.5	137	41.8	190	58.0
Combined therapy	262	79.9	264	80.5	191	58.2	138	42.0
Total	**328**	**100**	**328**	**100**	**328**	**100**	**328**	**100**

Table 10: Prescriptions with Generic name / Brand name

Drugs	Number of prescriptions	Percentage
Generic name	39	11.9
Brand name	289	88.1
Total	**328**	**100**

Repeated measure ANOVA and post hoc tests showed that the overall difference in mean pain scores on VAS scale measured at 0hr post operatively were not significant between the groups with a p-value of 0.559. However Mean pain scores measured at 2 hours and 6 hours were significantly higher in Group A compared to Group B and C (VAS scale p value 0.001 and 0.048) which shows that maximum reduction in the mean pain scores in group C at 2 hrs and group B at 6 hrs respectively. However the difference in the mean pain scores in group B and group C was not significant at 2 and 6 hrs post-operatively. (Post hoc Scheffe's test, p value 0.226 and 0.838). The difference in mean pain scores on VAS scale measured at 12 hr post operatively were not significant between the groups with a p-value of 0.130.

Table 11: Mean pain scores using VAS scale at specific time intervals

Post-op assessment time	Group A	Group B	Group C
0 hr	7.45	5.15	5.5
2 hrs	5.25	4.35	4.1
6 hrs	4.3	3.25	4.0
12 hrs	2.05	2.05	2.8

(Repeated measure ANOVA)

Therefore, both Tramadol & Diclofenac provided a substantial reduction in the pain intensity compared to intravenous Paracetamol infusion upto the first 6 hours postoperatively but statistically significant difference was not found between all the three groups at 12 hours.

Table 9: Mean pain scores at 0, 2, 6 and 12 hrs postoperatively

VAS	Group A	Group B	Group C	p Value
0 hr	7.45	5.15	5.5	0.559
2 hr	5.25	4.35	4.1	0.001
6 hr	4.30	3.25	4.0	0.048
12 hr	2.05	2.05	2.8	0.130

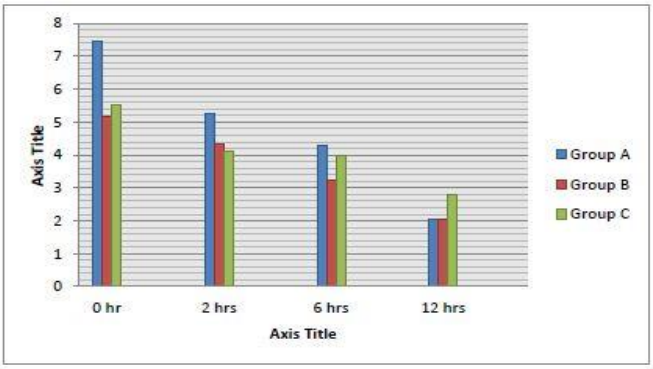

Fig. 1: Mean pain scores at 0, 2, 6 and 12 hrs postoperatively

Discussion

The use of conventional NSAIDs like Diclofenac (48%) and Paracetamol (29.6%) was seen more in the present study. The most commonly used analgesic was Diclofenac which is in contrast with the study conducted by Dasta JF et al.[9] which reported that Morphine was the commonly used analgesic in the post-operative pain management but consistent with the findings of Dashputra AV, Badwaik RT.[10]

According to our study the most frequently used non-opioid analgesic was Diclofenac by both intramuscular and intravenous route followed by Paracetamol intravenously. Diclofenac was prescribed both as monotherapy and in combination therapy.[11]

According to several studies the adverse effects profile of non-opioid drugs is less than that of opioid drugs.[11] The requirement of opioid analgesic in the early post-operative period can be reduced by using the non-opioid drugs.[10] Findings in this study are comparable with Dashputra AV et al, Chaudhari JS et al and Vallano A et al suggesting that, non-opioid analgesics are the preferred drugs for the treatment of postoperative pain relief.[10-14]

Opioids like Tramadol, Pentazocine were prescribed as monotherapy 17.6% & 4.8% respectively only on the day of surgery with good pain control. But its use has reduced from 1st postoperative day to 3rd Post-operative day, whereas Diclofenac use remained almost the same throughout the observed period which reduced from 63% on the day of surgery to only 57% on the 3rd day showing its effective pain control.

Moreover, NLEM India, promotes prescription by generic names.[15] In our study a total of 289 prescriptions (88%) were prescribed by brand name and 39 prescriptions (12%) drugs were given by generic name which was similar to the findings observed by Tabish A et al (84.08%) and Bhansali NB et al (51.43%).[2,16]

Conclusion

The post operative cases can be managed with conventional NSAIDs and non NSAIDs like Tramadol to little extent. These are relatively safe drugs for short course therapy (<10days), with minimal side effects. Single analgesic was used parenterally in maximum number of cases in the early post-operative period. The prescription of drugs in brand name could be changed to Generic name.

Drug utilization studies are need of the hour for rational prescription of drugs. Every nation should have their own National essential list of drugs, which can be arrived at observing and monitoring the pattern of usage of drugs and associated adverse effects. There is always scope for improvement of rational prescribing by introducing appropriate educational interventions, which may be considered as an effort to improve quality of health care.

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Conflict of interest

None.

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