

## Placebo Controlled Comparative Study of Efficacy of Diclofenac and Ketoprofen Transdermal Patches In Attenuating Intravenous Cannulation Pain

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**Abstract:** In adult patients venous cannulation, though painful, is often performed without analgesia. Numerous strategies are available to minimize the pain including local skin infiltration, ethyl chloride spray, inhalation of nitrous oxide, topical application of eutectic mixture of local anesthetics (EMLA) or application of non-steroidal anti-inflammatory drugs. In this study we compare the efficacy of diclofenac and ketoprofen transdermal patch with placebo in attenuating intravenous cannulation pain in patients posted for elective surgeries. 150 patients aged 18- 55yrs of ASA I and II were selected and divide into groups of 50 each. In Group I (control) PTP-Placebo control patch, Group II KTP- ketoprofen transdermal patch and Group III DTP-diclofenac transdermal patch was applied 4 hrs before venous cannulation and VAS score was observed. Transdermal diclofenac and ketoprofen patch significantly decreased both the incidence and severity of pain associated with cannulation without any adverse effects. However ketoprofen patch fared better in reducing the severity of pain.

**Keywords:** Intravenous cannulation, Pain, Transdermal patch

### I. Introduction

In adult patients venous cannulation, though painful, is often performed without analgesia. EMLA cream has been proved to provide good pain relief<sup>1,2</sup> with many alternatives like application of capsaicin patch, ethyl chloride spray<sup>3</sup>, transdermal NSAID patched<sup>4,5,6</sup>, playing music<sup>7</sup> and flashing light<sup>8</sup> (distractive measures). Topical application of diclofenac patch has known to be effective in reducing visual analogue score (VAS) of intravenous cannulation (IVC).<sup>1,4</sup>

Pharmacokinetic data indicate that the transdermal non-steroidal anti-inflammatory drugs (NSAID) preparations have high tissue concentration to excrete therapeutic effect while the plasma concentrations are low enough not to result in systemic adverse effects.<sup>4,5</sup>

In this study we compare the efficacy of diclofenac and ketoprofen transdermal patch with placebo in attenuating intravenous cannulation pain.

### II. Methodology

This comparative study was done on patients at R. L. Jalappa Hospital & research centre, Kolar, posted for elective surgery over a period of 6 months. After approval from our institutional ethics committee, 150 patients aged between 18-55 years, with ASA I and II were selected.

Patients with known allergy and sensitivity to NSAIDS, skin lesion, scars, eczema and infection at the site of venous cannulation, history of analgesic intake within previous 24 hours were excluded from the study.

After obtaining informed consent, 150 patients were randomly allocated into 3 groups of 50 each.

Group I (control) PTP-Placebo control patch.

Group II KTP- ketoprofen transdermal patch

Group III DTP-diclofenac transdermal patch

All patients were examined a day before surgery, all were kept fasting overnight after 10pm and received tab Ranitidine 150mg as premedication on night before the surgery.

On the day of surgery four hours before shifting to preanesthetic room, ketoprofen transdermal patch / diclofenac transdermal patch / Placebo control patch, according to the randomization was applied over the dorsum of non-dominant hand. In the pre anaesthetic room, the patch will be removed and patients were cannulated with an 18G IV cannula. Pain of venous cannulation was assessed with a visual analogue scale 0- 10 (0 – no pain, 10 – worst possible pain) (VAS).

All patients were observed for first 24 hours after surgery for blanching, erythema or swelling over venipuncture site. Any patient whose veins could not be cannulated at first attempt were excluded from further analysis.

Results were analyzed using ANOVA and Post Hoc Bonferroni test.  $P < 0.05$  was considered statistically significant.

### III. Results

Patients were age and sex matched. (Table 1&2)

VAS score for venous cannulation pain in the ketoprofen group ( $2.14 \pm 0.96$ ) was lower compared with diclofenac ( $3.14 \pm 0.76$ ) and the placebo group ( $5.18 \pm 1.003$ ) which was statistically significant as shown by ANOVA (Table 3).

And the VAS score in diclofenac group was significantly lower compared with the placebo group. There were no adverse effects in any of the groups.

Post Hoc Bonferroni showed significance with in groups.

### IV. Discussion

Anticipation of pain and anxiety associated with venous cannulation may add to overall stress experienced by patients in the perioperative period. Numerous strategies are available to minimize the pain of venous cannulation for surgical patients, including local skin infiltration, ethyl chloride spray, inhalation of nitrous oxide, topical application of eutectic mixture of local anesthetics (EMLA) or application of non-steroidal anti-inflammatory drugs.

Each technique has its distinctive advantages as well as limitations EMLA cream, one of the popular methods for decreasing venous cannulation pain, is associated with skin blanching <sup>1,2</sup> Recently transdermal diclofenac patch <sup>4</sup> and ketoprofen patch <sup>5</sup> has been reported to be effective in attenuating pain associated with venipuncture.

Non-steroidal anti-inflammatory drugs are effective analgesics. They inhibit prostaglandin synthesis at the site of application, and reduce the inflammatory response to cannulation. The benefits of topical administration of an NSAID are well established and offer the advantage of enhanced local drug delivery to affected tissues with a lesser incidence of adverse systemic effects as a result of less plasma concentrations. The application of NSAID gel to the cannulation site has been reported to decrease the incidence of thrombophlebitis.<sup>4</sup>

The present prospective randomized study was done to evaluate and compare diclofenac and ketoprofen transdermal patches with placebo controlled patches in reducing venous cannulation pain. The results of this study suggest that the application of a diclofenac or ketoprofen transdermal patch at the venipuncture site 4 hrs before venous cannulation decreased the incidence and the severity of pain associated with venipuncture. Ketoprofen group fared better compared to diclofenac in reducing the severity of pain.

Venipuncture, although a minor procedure, can be painful and alarming for the patient, and may therefore prove to be problematic for the anesthetists. Another study revealed that pain perception was significantly more in females than men.<sup>9</sup> A painful experience during venipuncture may lead to significant consequences including adverse physiological responses during subsequent procedures that follow. Transdermal NSAID patches provide a reliable method in prevention of pain following venipuncture and physiological responses during subsequent procedure.

### V. Conclusion

We conclude from our study that transdermal diclofenac and ketoprofen patch applied 4 hrs before venous cannulation significantly decrease both the incidence and severity of pain associated with it without any adverse effects. However ketoprofen patch fared better in reducing the severity of pain.

### Results

Patients were age and sex matched. (Table 1&2)

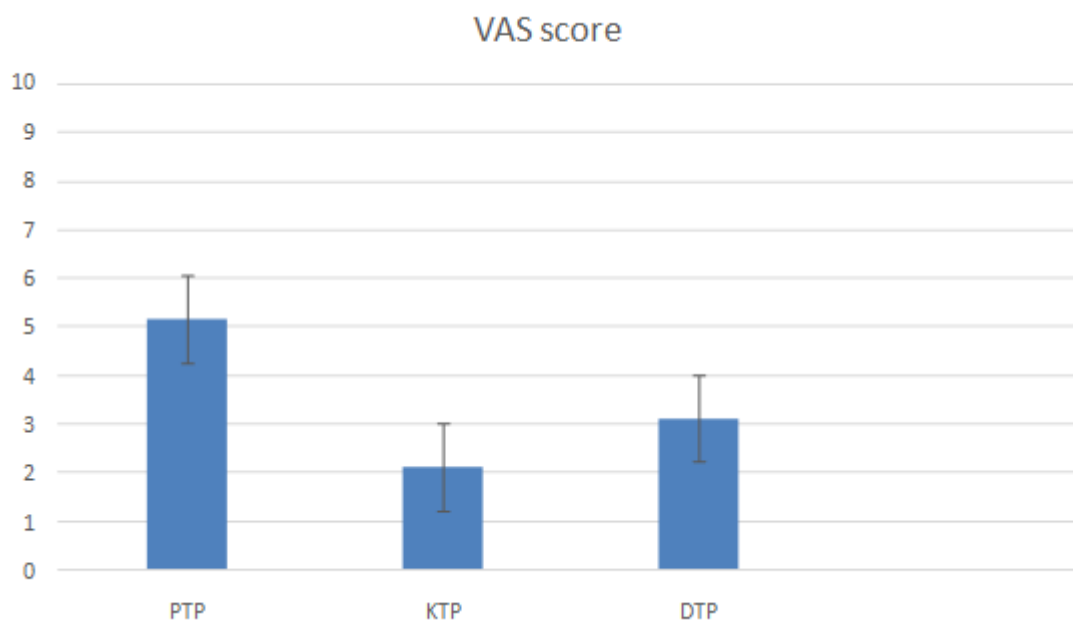
		GROUPS			Total	
		G I	G II	G III		
AGES	<20	Count	3	3	5	11
		% of GROUPS	6.0%	6.0%	10.0%	7.3%
	21-30	Count	11	21	12	44

		% of GROUPS	22.0%	42.0%	24.0%	29.3%
31-40	Count		10	11	12	33
	% of GROUPS		20.0%	22.0%	24.0%	22.0%
41-50	Count		11	9	16	36
	% of GROUPS		22.0%	18.0%	32.0%	24.0%
51-60	Count		9	3	4	16
	% of GROUPS		18.0%	6.0%	8.0%	10.7%
61-70	Count		6	3	1	10
	% of GROUPS		12.0%	6.0%	2.0%	6.7%
Total	Count		50	50	50	150
	% of GROUPS		100.0%	100.0%	100.0%	100.0%

Table1: Showing age groups ( Statistically not significant)

			GROUPS			Total
			G I	G II	G III	
SEX	Male	Count	34	30	23	87
		% of GROUPS	68.0%	60.0%	46.0%	58.0%
	Female	Count	16	20	27	63
		% of GROUPS	32.0%	40.0%	54.0%	42.0%
Total	Count	50	50	50	150	
	% of GROUPS	100.0%	100.0%	100.0%	100.0%	

Table 2: showing Male and Female percentages.(Statistically not significant)



Graph 1- comparison of mean VAS scores in the three groups .

VAS SCORE	Groups			P value
	Group PTP	Group KTP	Group DTP	
Mean $\pm$ SD	5.18 $\pm$ 1.003	2.14 $\pm$ 0.96	3.14 $\pm$ 0.76	P < 0.001

Table 3: One way Anova of VAS score in group PTP, group KTP & group DTP.

Mean VAS scores and P values showing that ketoprofen group significantly reduces pain compared to the placebo and the diclofenac group.

VAS score for venous cannulation pain in the ketoprofen group (2.14±0.96) was lower compared with diclofenac (3.14±0.76) and the placebo group (5.18±1.003) which was statistically significant. And the VAS score in diclofenac group was significantly lower compared with the placebo group. There were no adverse effects in any of the groups.

			VAS score
Group PTP	versus	Group KTP	P < 0.001
Group KTP	versus	Group DTP	P < 0.001
Group PTP	versus	Group DTP	P < 0.001

**Table 4: Post hoc Bonferroni of VAS score between group PTP, group KTP & group DTP.**

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