

Analgesic effect of dermatological patch in orthodontic Patients

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Abstract

Background: There are various routes in drug delivery system including intra-venous, intra-muscular, oral, sublingual etc. In all these routes time of action of drug, life of the drug differs. In oral route the drug is absorbed into circulation then it is metabolised in liver and then only the action of drug begins. As in transdermal patches the action of the drug is slow but has a long life i.e., the effect of drug in the body is long compared to other routes. Dental pain is very common in orthodontic treatment due to the movement of the tooth and the pressure exerted by the orthodontic system. So this study will involve in evaluation of pain relief in patients taking tablets verses patients who are not taking tablets verses patients using transdermal patch undergoing orthodontic treatment

Aim: To analyse the analgesic effect of transdermal patch in patients who are undergoing orthodontic treatment

Materials and methods: 20 selected randomly after the placement of initial niti wire in mild crowding .1-4mm little irregularity index without extraction of teeth were selected for the study. Among that 10 were given trans-dermal patch (NUPATCH-DICLOFENAC SODIUM) and other 10 were not given trans-dermal patch. Pain intensity was noted using pain chart which was given to the patient and collected after 2 days. Pain was noted in time interval of 1hour, 4 hour, 1 day and 2 day. All the data were collected, which was computed and Statistics was done

Results : All the data were statistically analyzed using spss software and the mean were analysed. It is found that that the analgesic dermatological patch has a good action in reducing dental pain , due to its long half life period and less systemic toxicity.

Conclusion : Use of transdermal patch has a significant analgesic effect. This study reveals that transdermal patch had a significant analgesic effect and can also be used in routine dental practice.

Keywords: trans-dermal patch, analgesics, dental pain

1. Introduction

There are various routes in drug delivery system including intra-venous, intra-muscular, oral, sublingual[1]. In all these routes time of action of drug, life of the drug differs. In oral route the drug is absorbed into circulation then it is metabolised in liver and then only the action of drug begins[5]. As in transdermal patches the action of the drug is slow but has a long life ie., the effect of drug in the body is long compared to other routes[2].The major components of the transdermal patch are the drug, liner membrane, adhesive, and backing. The liner protects the patch during storage and is removed prior to use.[3] Membrane controls the release of the drug from the reservoir[4]

The skin has evolved as a formidable barrier against invasion by external microorganisms and against the prevention of water loss[5]. Transdermal drug delivery tems have been designed with the aim of providing continuous controlled delivery of drugs via this barrier to the systemic circulation[6]Dental pain is very common in orthodontic treatment due to the movement of the tooth and the pressure exerted by the orthodontic system[7]. This pain is due to the inflammatory reaction. There is a simultaneous osteoclastic activity and osteoblastic activity which aids in the movement of the tooth[8]. The pain usually starts when the system gets into an active state. This pain varies from person to person as every person has different pain threshold or tolaratability to pain[9]. So this study will involve in evaluation of pain relief in patients taking tablets verses patients who are not taking tablets verses patients using transdermal patch undergoing orthodontic treatment.¹⁸⁻²²

2. Materials and methods

20 patients were randomly selected who has started undergoing orthodontic treatment. Then trans-dermal patch were given to 10 patients and a proforma were given to the patient which contain pain chart and a table which has time vs pain. The other 10 the proforma was given and no transdermal patch was given. The analgesic used was NUPATCH(diclofenac 200mg) was used. Pain intensity were marked by the patient at 1 hour, 4 hours, 12 hours, 1 day, 2 days and the proforma were collected after 2 days from the patients. All the data was then computed in Microsoft Excel and statistics was done using SPSS software and results were analyzed

3. Results

The Normality tests Kolmogorov-Smirnov and Shapiro-Wilks tests results reveal that the variable Pain score follows Normal distribution. To analyse the data parametric methods were applied. To compare mean pain scores between groups independent samples t-test is applied. To compare mean pain scores between time points paired samples t-test is applied. To analyse the data SPSS software was used.

Table 1 Independent sample T-Test to compare mean pain scores between groups.

Pain	Group	N	Mean	Std. Dev	t- Value	p- Value
Pain at 1 hour	With Medicine	10	8.00	1.414	0.171	0.866
	Without Medicine	10	7.90	1.197		
Pain at 4 hours	With Medicine	10	7.30	1.494	0.298	0.769
	Without Medi-	10	7.50	1.509		

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Pain at 12 hours	With Medicine	10	6.60	1.506	0.152	0.881
	Without Medicine	10	6.50	1.434		
Pain at Day 1	With Medicine	10	4.90	.994	0.798	0.435
	Without Medicine	10	5.40	1.713		
Pain at Day 2	With Medicine	10	2.40	.843	2.100	0.056
	Without Medicine	10	3.70	1.767		

Table 2 Paired Samples T-Test to compare mean pain scores between time points in With Medicine group.

Group	Pair	Pain	N	Mean	Std. Dev	t-Value	p-Value
With Medicine	Pair 1	Pain at 1 hour	10	8.00	1.414	2.689	0.025
		Pain at 4 hours	10	7.30	1.494		
	Pair 2	Pain at 1 hour	10	8.00	1.414	8.573	<0.001
		Pain at 12 hours	10	6.60	1.506		
	Pair 3	Pain at 1 hour	10	8.00	1.414	11.196	<0.001
		Pain at Day 1	10	4.90	.994		
	Pair 4	Pain at 1 hour	10	8.00	1.414	16.474	<0.001
		Pain at Day 2	10	2.40	.843		
	Pair 5	Pain at 4 hours	10	7.30	1.494	3.280	0.010
		Pain at 12 hours	10	6.60	1.506		
	Pair 6	Pain at 4 hours	10	7.30	1.494	9.000	<0.001
		Pain at Day 1	10	4.90	.994		
	Pair 7	Pain at 4 hours	10	7.30	1.494	12.943	<0.001
		Pain at Day 2	10	2.40	.843		

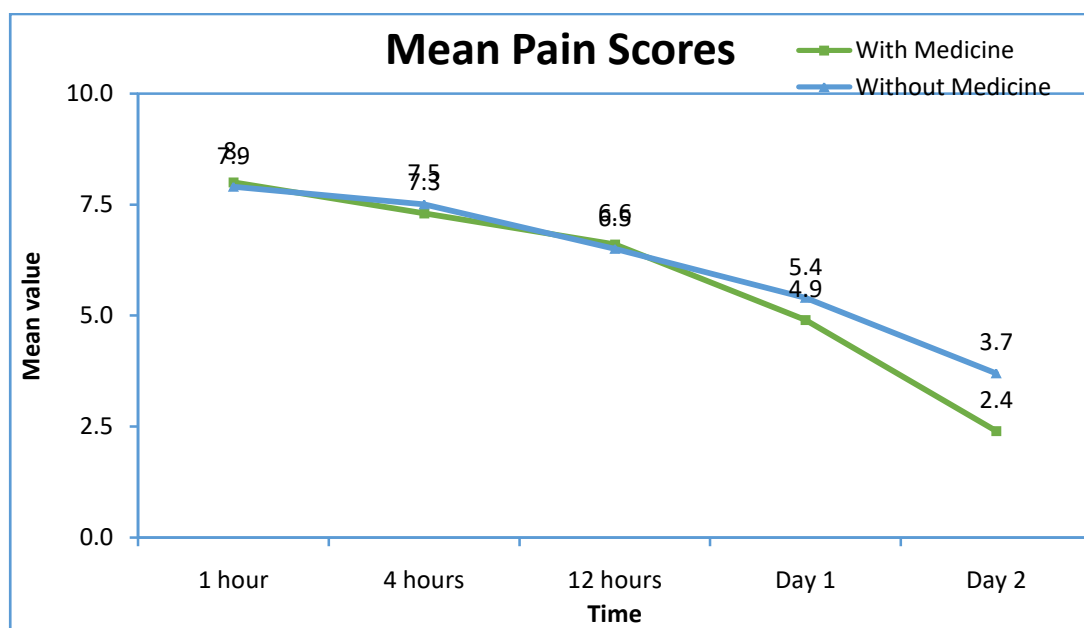
	Pair 8	Pain at 12 hours	10	6.60	1.506	6.530	<0.001
		Pain at Day 1	10	4.90	.994		
	Pair 9	Pain at 12 hours	10	6.60	1.506	12.860	<0.001
		Pain at Day 2	10	2.40	.843		
	Pair 10	Pain at Day 1	10	4.90	.994	9.303	<0.001
		Pain at Day 2	10	2.40	.843		

Table 3 Paired Samples T-Test to compare mean pain scores between time points in Without Medicine group.

Group	Pair	Pain	N	Mean	Std. Dev	t-Value	p-Value
Without Medicine	Pair 1	Pain at 1 hour	10	7.90	1.197	1.809	0.104
		Pain at 4 hours	10	7.50	1.509		
	Pair 2	Pain at 1 hour	10	7.90	1.197	5.250	0.001
		Pain at 12 hours	10	6.50	1.434		
	Pair 3	Pain at 1 hour	10	7.90	1.197	9.303	<0.001
		Pain at Day 1	10	5.40	1.713		
	Pair 4	Pain at 1 hour	10	7.90	1.197	10.804	<0.001
		Pain at Day 2	10	3.70	1.767		
	Pair 5	Pain at 4 hours	10	7.50	1.509	6.708	<0.001
		Pain at 12 hours	10	6.50	1.434		
	Pair 6	Pain at 4 hours	10	7.50	1.509	11.699	<0.001

		Pain at Day 1	10	5.40	1.713		
Pair 7	Pain at 4 hours	10	7.50	1.509	8.143	<0.001	
	Pain at Day 2	10	3.70	1.767			
Pair 8	Pain at 12 hours	10	6.50	1.434	4.714	0.001	
	Pain at Day 1	10	5.40	1.713			
Pair 9	Pain at 12 hours	10	6.50	1.434	5.715	<0.001	
	Pain at Day 2	10	3.70	1.767			
Pair 10	Pain at Day 1	10	5.40	1.713	3.597	0.006	
	Pain at Day 2	10	3.70	1.767			

Chart 1



4. Discussion

Trans-dermal patch is one of the recent advance in drug delivery system[10]. It is almost more effective than others as it is delivered in an active form[11]. Other form like encapsulated forms are given in an inactive form wherein the the drug is metabolised in the body from which it is connected to active form[12]. In this process the drug deposits metabolised remains in the human system which get filtered in the kidney which intern affect its function. In this aspect transdermal patch excels having the most least side-effects than any other type of drug delivery[13-17].

After all the data analysis was done in SPSS software. Individual t-test was done for each variable[table 1]. The values were statistically significant. It was observed at the end of one hour the patients had started developing the pain[table 3]. After the transdermal patch then comes to its action[table 2]. At the end of 4 hours the pain has slightly reduced in patient with transdermal patch. At the end of 12 hours almost both the category had the same intensity differing in about 1%. But at the end of 1 day the patient who wore the transdermal patch had gained a great advantage to those patients who were not using the transdermal patches. The differences between them were upto 1.5% which was statistically significant. Pain intensity experienced by the patient at the end of 2 days was the final reading of the study. It was observed that there was difference upto 3% was observed between the patients used the transdermal patch to the patient who had not used the transdermal patch. The mean of the results were graphically represented [chart 1]

The exclusive variables that affect this study include the pain tolerability of the patient which differ person to persons.

Similar study was conducted by Vinod Kumar et.al. In their study they have selected 100 adults patients who had underwent major surgery. The diclofenac transdermal patch was applied 2-3 cm away from the operated site. They had stopped other NSAIDs and the patch was changed every 24 hours and the pain intensity was recorded on a scale of 1-5. They have collected all the data and statistical analysis (Chi-Square test) was done. 34% of the patient showed an excellent relief, 38% of the patient showed a good relief, 27% patients showed fair relief and 1% of the person showed poor relief on the application of analgesic transdermal patch[2].

Another study done by HemantBhaskar et.al, where the professionals had compared the efficiency of transdermal diclofenac patch to that of the oral analgesics. In this study 20 young patient who are going to have a orthodontic treatment requiring bilateral maxillary and mandibular extraction were selected. After extraction of the right maxillary and mandibular premolar first dose of 50mg of oral diclofenac sodium were prescribed to take thrice daily. When the left maxillary and mandibular premolar was extracted 100mg of transdermal diclofenac was given. The pain intensity was recorded three consecutive days using pain relief score chart and 5 point verbal pain intensity.[1] It was observed that both the oral analgesics and the transdermal patch had almost equal effect but transdermal patch was so convenient and had no systemic effects compared to that of the oral analgesics[14]. Transdermal patch which has less systemic toxicity[15] and has long half life increasing the longevity of the drug in the body[16].

5. Conclusion

This study concluded that the transdermal analgesic patch has a good advantage in analgesic effect in dental treatments. Thus transdermal analgesic patch can be used as an analgesic instead of the oral analgesics.

6. Reference

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