

## Original Research

### Use of diphenhydramine hcl as a local anesthetic for tooth extraction

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#### ABSTRACT:

**Introduction:** The use of Diphenhydramine hydrochloride as an alternative to local anesthetic solution has been advocated by various authors in patients claiming allergy to amides &/or esters. The present study is aimed at determining the local anesthetic efficacy of diphenhydramine HCl in exodontia. **Material & method:** Ten patients with alleged history of allergy to local anesthetic agents (LA with/without methyparaben) were given diphenhydramine hydrochloride as an alternative anesthetic agent and the local anesthetic efficacy of same was determined by comparing it with control group (ten nonallergic patients receiving lignocaine HCl) in terms of time of onset of anesthesia, duration of anesthesia & pain on VAS. **Result:** In the present study, the mean time of onset of anesthesia with diphenhydramine (range, 4 to 7.5 minutes), was not significantly different from that of lignocaine; (range, 4 to 13 minutes). The duration of anesthesia was significantly longer and the mean visual analogue scale score was slightly more in these patients as compared to patients receiving lignocaine. **Conclusion:** In this small study group diphenhydramine hydrochloride provided adequate anesthesia without any significant complications & thereby can be used as an effective alternative anesthetic agent in patients with allergy to amide &/or ester anesthetic agents.

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#### INTRODUCTION

True allergic reaction to local anesthetics is unknown, but several adverse reactions have been reported with them so far. In order to avoid such untoward situations, an alternative drug to local anesthetics should be available. Rosenthal and Minard in 1939 described the local anesthetic properties of antihistamines.<sup>1</sup> Antihistamines possess anesthetic properties in the same manner as the latter possess antihistaminic properties. Diphenhydramine hydrochloride has been used as an alternative anesthetic agent in patients allergic to amide &/or esters in laceration repair,<sup>2</sup> in dermatologic procedures,<sup>3</sup> and in tooth extraction.<sup>4</sup> Diphenhydramine (DPH; Benadryl) and tripelenamine (pyribenzamine) are the most effective and the least toxic antihistaminic agents which can be used as local anesthetics.<sup>5</sup> The structural similarity of DPH with other neural blocking agents is suggested to be responsible for its anesthetic properties.<sup>6</sup> DPH belongs to the ethanolamine group of antihistaminics that possesses anticholinergic (antispasmodic), antiemetic, and strongly sedative effects. DPH can be

administered intravenously or by deep intramuscular injection with a maximum daily dose of 400 mg. The main side effect of DPH include drowsiness, however the doses used in dental practice are relatively small and would not be problematic unless an inappropriate intravenous injection were made. The other adverse effects of antihistamines include confusion, nausea, diplopia, xerostomia, mucosal dryness (throat, nose), headache, urticaria, and anaphylactic shock.<sup>1</sup>

#### AIMS & OBJECTIVES

To determine the efficacy of diphenhydramine hydrochloride as a local anesthetic agent in exodontia by comparing its anesthetic properties with 2% lignocaine hydrochloride with epinephrine under the following parameters- onset of anesthesia, duration of anesthesia, and pain on VAS.

#### MATERIAL AND METHOD

The present study was done in the Department of Oral & Maxillofacial Surgery, Govt. Dental College & Hospital, Srinagar after explaining the procedure to all the patients in their vernacular language & taking

their written informed consent. A total of 20 subjects(10 subjects allergic to local anesthetics and 10 non allergies) between the age group of 17 and 40 years, both male and female who needed extraction in either arch were included in the study.

**EXCLUSION CRITERIA**

Patients were excluded if they were allergic to diphenhydramine, medically compromised, uncooperative patients, pregnant females, glaucoma, or prostate problems; or if they did not want to participate in the study.

**MATERIALS USED**

- The diphenhydramine solutions were mixed as 0.5% solution by diluting a 1-mL vial of 50 mg diphenhydramine with 9 mL of saline.

- Commercially available injection of lignocaine hydrochloride 2% and adrenaline(1:80000).

**METHOD**

- Group I:included patients who were apparently allergic to local anesthetics & underwent extraction with diphenhydramine solution&
- Group II: included normal patients who underwent extraction with lignocaine hydrochloride injection.
- The selected parameters including onset of anesthesia, duration of anesthesia in minutes, a 10 cm visual analog scale (VAS) is used to assesspost-operative pain and post-operative complications if any were noted.All injections and extractions were performed by thesame clinician, and records were taken by two clinicians.

**RESULTS**

**Table I. Efficacy and complications of local anesthesia and patient characteristics in DPH-administered study group**

Age(yrs)	Sex	Tooth extracted	Onset of anesthesia (mins)	Duration of anesthesia (mins)	VAS	Post-operative Complications
19	M	36	25	54	2	-
25	F	46	22	51	0	Edema
31	F	44	20	43	3	Nausea
29	M	26	15	45	4	-
38	M	37	12	33	1	-
34	M	23	NA	NA	-	-
23	F	24	13	31	3	-
31	M	35	18	44	1	Drowsiness
26	M	36	15	36	3	-
41	F	45	14	53	5	Drowsiness

M: Male, F:Female, NA: Not Applicable

**Table II. Efficacy and complications of local anesthesia and patient characteristics in Lignocaine-administered control group**

Age(yrs)	Sex	Tooth extracted	Onset of anesthesia (mins)	Duration of anesthesia (mins)	VAS	Complications
31	M	16	10	52	0	-
22	M	46	9	46	0	-
27	F	34	15	52	1	Edema
35	M	36	21	44	0	-
41	F	37	13	56	3	-
38	M	14	12	51	1	-
44	F	23	9	53	0	-
23	M	27	11	61	2	-
43	F	36	18	50	1	-
27	F	25	12	63	2	-

M:Male, F:Female.

Out of 10 patients of Group I(Diphenhydramine group),one was excluded from the study because of failure of anesthesia. Out of remaining 9 patients, 5 were male and 4 were female patients with mean age of 29.7 years. In Group II (Lignocaine group), out of 10 patients 5 were male and 5 female patients with mean age of 33.1 years. There was no statistically

significant difference in age and gender between the two groups.

Onset of anesthesia as demonstrated by numbness of lips and tongue on palpation was less in Group II patients (Lignocaine group) with mean value of 14.44 mins as compared to Group I patients (Diphenhydramine group) with mean value of

15.4mins, however the difference was not statistically significant ( $p$  value  $< 0.05$ ).

The mean duration of anesthesia for Group I was 43.33 mins while the mean duration of anesthesia for Group II was 53.1 mins and the difference was statistically significant ( $p$  value  $< 0.05$ ) which indicates that the duration of anesthesia is more in patients receiving lignocaine hydrochloride anesthesia as compared to patients receiving diphenhydramine hydrochloride as local anesthesia.

The mean VAS score for Group I was 2.44 while for Group II it was 1 and this difference was statistically insignificant ( $p$  value  $< 0.05$ ).

Out of 9 patients receiving diphenhydramine hydrochloride anesthesia 2 reported drowsiness in post-extraction period, 1 noticed edema and 1 nausea post operatively whereas only 1 out of 10 patients receiving lignocaine hydrochloride developed edema post operatively.

## DISCUSSION

True allergic reactions compose only about 1% of all adverse reactions to local anesthetics.<sup>1</sup> Local anesthetics in dental use today are amides, which accounts for the low incidence of allergic reaction compared to ester-type local anesthetics.<sup>7,8</sup> Other allergens in local anesthetics are metabisulphites and methylparaben, the latter of which is not used in the United States.<sup>7</sup> Adverse drug reactions to local anesthetics, which are frequently reported, consist of overdose reactions, vasovagal syncope, and epinephrine reactions; these generally result in a patient's being erroneously labelled allergic. Unless it is proved erroneous, however, a patient's claim of allergy needs to be taken seriously. As a result, the dentist often encounters patients who must be anesthetized with an alternative local anesthetic agent for dental procedures. DPH can be used as a local anesthetic in ester with allergic patients.<sup>1,9,10,11</sup>

Tripelennamine HCl (Pyribenzamine) or N-pyridyl-N-benzyl-N'-dimethylethylenediamine and diphenhydramine HCl (Benadryl) or 2-(diphenylmethoxy)-N,N-dimethylethylamine HCl are the two antihistamines most commonly used as local anesthetic agents in dentistry. The former is not currently available in injectable form but only the tablet form is available which is used for treating allergic rhinitis like conditions.<sup>1</sup> DPH has been used as an alternative to local anesthetics in dentistry in the doses of 15-50mg.<sup>7</sup>

Lidocaine and diphenhydramine have been compared previously in dermatologic procedures,<sup>3</sup> dental procedures,<sup>4</sup> and laceration repair.<sup>13</sup> Dermatologic studies of 1% diphenhydramine have shown that it is an effective anesthetic but that a 0.5% solution was not adequate as an anesthetic in intact skin.<sup>3</sup> Although the total amount of DPH that can be administered at one time for dental procedures has not been established, 50 mg (5 ml from 1% solution) has been sufficient to achieve adequate anesthesia. The maximum

intravenous dose is 100 mg; thus, if necessary, the 50 mg dose may be exceeded.<sup>4</sup> Although higher concentrations of the medication cause several adverse effects, most frequently drowsiness, the locally administered and relatively small doses used for extraction are not associated with significant systemic adverse effects. The local irritant effect of DPH in oral tissues has been reported in previous studies.<sup>1,5,14</sup> Clause and Zach<sup>15</sup> described diffuse edema of the upper lip, cheek, and eyelids after the injection of 10 mg/ml of DPH to the maxillary anterior area.

Malamed<sup>1</sup> injected DPH (50 ml) with 1/100,000 epinephrine and achieved sufficient anesthesia. The most important complaints observed were burning sensation, slight edema, and erythema after inferior alveolar nerve blocks. Complications of DPH injection in dentistry are ulceration, burning sensation,<sup>1</sup> edema,<sup>15</sup> and vesicle formation.<sup>16</sup> Gallo and Ellis<sup>4</sup> suggest that DPH is effective for surgical extractions, especially if osseous surgery is not required. For the most part, these studies evaluated only subjective symptoms.

The manufacturers<sup>16,17</sup> caution that because of the possible drowsiness caused by antihistaminics patients receiving these agents should be advised not to drive a car or operate heavy machinery or appliances. Several of the authors cited above mention drowsiness as a factor to be alert for when using these agents<sup>12,18</sup>. With the small average dosages used in dental practice this side effect is seldom encountered, unless we inadvertently inject intravascularly. Other adverse reactions which occasionally occur with the use of antihistamines are: confusion, nausea, diplopia, dryness of the mouth, throat and nose, headache and urticaria. There are several reported cases of apparent anaphylactic shock caused by the injection of diphenhydramine<sup>17</sup>.

In the present study, the use of diphenhydramine hydrochloride as an alternative local anesthetic agent was evaluated by comparing its onset of anesthesia, duration of anesthesia, intra-operative pain and associated complications with lignocaine hydrochloride anesthetic agent as control.

The use of DPH as a local anesthetic is widely accepted,<sup>15</sup> although it has not been studied extensively. According to Ernst AA, Anand P, Nick T, et al no statistically significant difference in anesthetic potential is present between 1% diphenhydramine and 1% lignocaine, although 1% diphenhydramine was more painful to inject, according to patients. In this study, the onset of anesthesia for diphenhydramine hydrochloride and lignocaine hydrochloride was compared and it was found to be statistically insignificant. This was in accordance with the study conducted by Sina Uckan, et al in 1998 for comparing the anesthetic efficacy of diphenhydramine with prilocaine.

The difference between the duration of anesthesia for diphenhydramine and lignocaine was compared and

was statistically significant, again in accordance with the study conducted by Sina Uckan et al.

The intra-operative pain evaluated between the two groups was statistically insignificant. This was in accordance with the study conducted by Ernst AA, Anand P, Nick T, et al who concluded that Diphenhydramine 0.5% causes comparable injection pain and retains its anesthetic potential compared to 1% lidocaine. A recent study demonstrated that warmed solutions were less painful to inject than refrigerated solutions.<sup>19</sup>

Complications associated with diphenhydramine hydrochloride in this study were not significant because of low doses of drug used in dentistry.

### CONCLUSION

The present study reveals that diphenhydramine hydrochloride has a local anesthetic effect comparable to lignocaine hydrochloride. Thereby, it can be safely used as an alternative to conventional local anesthetic agents in patients claiming allergy to caines

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