

ORIGINAL RESEARCH

Effect of Hypnosis during Administration of Local Anesthesia in Pediatric Patients - A Pilot Study

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ABSTRACT

Aim: The most challenging aspect of pediatric dentistry is getting the patient to accept the treatment readily. Fear of painful procedures, particularly, administration of local anesthesia, can result in severe anxiety and avoidance behavior in children. Hypnosis is a tool that can help dentists allay this fear. The aim of this study was to determine whether hypnosis alters resistance shown during administration of local anesthesia in children.

Materials and Methods: A total of 20 patients (8 males, 12 females) aged between 6 and 14 years, who required at least two appointments and where local anesthesia had to be administered, were selected and evaluated twice, once utilizing hypnosis before administration of local anesthesia, and once without hypnosis. Each participant was monitored with a pulse oximeter, pulse rate and oxygenation levels were taken at baseline and on the administration of local anesthetic, and resistance shown was noted. These findings were statistically analyzed.

Results: Children under hypnosis exhibited lesser resistance to the administration of local anesthesia and showed significantly lower pulse rates. There was no significant difference in oxygenation levels or between different ages or order of treatment.

Conclusion: Hypnosis can be a good option to manage behavioral problems as it leads to lesser resistance and lowered anxiety in pediatric patients.

Keywords: Children, Hypnosis, Local anesthesia, Pulse rate, Resistance.

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INTRODUCTION

The most challenging aspect of pediatric dentistry is behavior management and getting the child patient to accept the treatment readily. Avoidance of regularly visiting the dentist is strongly attributed to severe dental anxiety or fear of painful procedures, particularly, the administration of local anesthesia.^[1] The prevalence of needle phobia is high; greater than 20% in some populations, being more in the younger age groups, with a slight female pre-ponderance. Approximately 5–15% of the population decline necessary dental treatment primarily for fear of oral injections.^[2] There are several techniques that dentists can use to manage patient anxiety.^[3,4] Hypnosis is one such tool that can help pediatric dentists allay this fear, or at least increase patient cooperation while administering local anesthesia. Hypnosis is defined as an artificially induced altered state of consciousness, characterized by heightened suggestibility, and receptivity to direction.^[5]

Children are more inclined to hypnosis than adults due to their imaginary capability.^[6] Hypnotic techniques are particularly effective when used with children between 8 and 12 years and children as young as 4-year-old can be responsive to hypnosis,^[7] yet hypnosis as an adjunct to pediatric dental procedures is generally underused. In 2013, Peretz *et al.*^[11] reviewed the techniques for hypnosis which can be used in pediatric dentistry. A Cochrane review on pediatric dentistry and hypnosis^[8] revealed that only three randomized control trials (RCTs) (with 69 participants) done on this topic which fulfilled the methodological quality criteria of RCTs. Out of these three trials, one was unpublished (Braithwaite 2005). Hence, this study was carried out to determine whether hypnosis alters resistance shown during the administration of local anesthesia in pediatric dental patients. The administration of local anesthesia was the choice of dental procedure as needle phobia is highly associated with anxiety and avoidance behavior in children.

MATERIALS AND METHODS

Before the start of the study, the study protocol was approved from the concerned institute's Ethics Committee. The present study was a randomized,

case-control, crossover, pilot study. A total of 20 pediatric patients (8 males, 12 females) between the age of 6–14, whose treatment plan consisted of at least two extractions or pulp therapies, requiring them to be administered with local anesthesia, were selected for the study. Each child had no previous dental experience and had American society of Anesthesiologists' classification I medical histories. The purpose of the study was explained to their parents, and informed written consent was taken. This was a crossover study in which each child acted as his or her own control, so the effect of hypnosis could be compared in the same individual. Each child required at least two appointments where local anesthesia had to be administered and was evaluated twice, once utilizing hypnosis before the administration of local anesthesia and once without hypnosis. The patients were randomly divided into two groups - Group I and II. In Group I, the patients were given local anesthesia without hypnotic induction in the first appointment and with hypnotic induction in the next appointment. In Group II, the patients were given local anesthesia with hypnotic induction in the first appointment and without hypnotic induction in the next appointment.

A session of hypnosis normally begins with a "hypnotic induction." This usually consists of a series of suggestions that direct the participants to relax and to become absorbed in their inner experiences, such as feelings, thoughts, and imagery. Each patient was asked to focus on one point. The patient was then asked to focus on his breaths and holding his breath for five counts and then breathing out. This exercise was done till the patient was completely relaxed. As the patient was focusing on one point, he was asked to close his eyes and count in reverse order from 50. After random intervals, the clinician used to snap his fingers and the patient would go one up from the number he was at and again start the reverse countdown. When the child reached 0, the clinician lightly touched the third eye between the eyebrows and used the word "deep sleep," telling the child to gently shut his eyes. Then, the clinician talked to the child in a gentle soothing voice about how different parts of the child's body were relaxing. The script of arm levitation^[7] was read out to the patient to check for his suggestibility. The suggestibility was checked using Stanford hypnotic scale form for ages 6–16.^[7] An objective observer was called into the operatory by pressing a button which gave a signal in the adjoining room. While the eyes were closed, the inferior alveolar nerve block was administered. The objective observer present in the operatory noted whether the child showed any resistance to administration of local anesthesia or not, and then left the operatory. Thereafter, the patient was brought out of hypnosis by counting to five.

The same pediatric dentist administered the local anesthetic for all patients, always in the same operatory. This same dentist, certified in integrated clinical hypnotherapy, also performed the hypnotic suggestion using a hypnotic script,^[7] at the appropriate visit. A second objective pediatric dentist noted the findings. This objective dentist was blind to whether the child had hypnotic intervention or not. Each participant was monitored with a pulse oximeter and readings were taken at baseline (before hypnotic suggestion or any other procedure) and at tissue penetration on administration of local anesthetic. Parents were absent during the treatment, and the children had no other type of audiovisual distraction. All the findings were collected and passed blind to an independent statistician.

RESULTS

The statistical analysis was carried out using Statistical Package for Social Sciences (SPSS Inc., version 14.0 for Windows). Descriptive statistics and chi-squared test was used to establish the relationship between the groups and different parameters under study such as resistance shown, gender, age, and the treatment order. Contingency coefficient was used to measure the degree of relationship for data with the appropriate degrees of freedom. Statistical significance was determined at $P < 0.05$.

The study sample comprised 20 children (12 females and 8 males) aged between 6 and 14 years (mean age 9.8), each of whom were evaluated twice - once with and once without hypnosis. There were three dependent variables - change in pulse rate (measured in beats per minute), change in oxygenation level (measured in percentage saturation), and resistance shown. Change was measured from baseline to the time the injection was given. Table 1 shows the mean and standard deviation of pulse rate and oxygen level under both the conditions - with and without hypnosis. The change from baseline to injection is also shown. There was significant difference ($P < 0.05$) in pulse rate attributable to the hypnotic condition, but neither to gender, age nor to the order of treatment. There was no significant difference in oxygen saturation level attributable to the hypnotic condition, gender, age, nor to the order of treatment. Table 2 shows the association between gender and response to hypnosis. Table 3 shows the biserial correlation for age and resistance in each group.

DISCUSSION

Pain threshold varies between different individuals. The present study was designed as a crossover study so that each individual would be compared with

Table 1: Mean and standard deviation pulse rate and oxygen level

Method	At baseline	After injection
	Mean±SD	Mean±SD
Pulse rate (beats per min)		
With hypnosis	107.65±4.74	93.40±4.56
Without hypnosis	104.20±4.52	108.45±4.86
P value	0.024	0.000
Oxygen level (%)		
With hypnosis	97.85±0.67	97.75±0.63
Without hypnosis	97.80±0.69	97.85±0.48
P value	0.818	0.582

Interpretation: P value less than that of 0.05 indicates significant difference

Table 2: Association between gender and response to hypnosis

Groups	Method	Resistance		Total	P value
		Not shown	Shown		
Group 1	With hypnosis				
	Gender				
	Male	4	1	5	0.490
	Female	3	2	5	
Total	7	3	10		
Group 2	Without hypnosis				
	Gender				
	Male	4	1	5	0.010*
	Female	0	5	5	
	Total	4	6	10	
	With hypnosis				
	Gender				
	Male	3	0	3	0.301
	Female	5	2	7	
	Total	8	2	10	
	Without hypnosis				
	Gender				
Male	1	2	3	0.490	
Female	1	6	7		
Total	2	8	10		

Interpretation: *P value less than that of 0.05 shows significant association.

Table 3: Bi-serial correlation for age and resistance in each group

Method	Correlation value for age against resistance	P value	Interpretation
With hypnosis	0.081	0.734	Non-significant weak positive correlation
Without hypnosis	0.197	0.404	Non-significant positive correlation

Interpretation: p-value less than that of 0.05 indicates significant difference

themselves in two different situations, and therefore, the differences in pain threshold would not result in bias in reporting the results.

Statistical significant difference was noted in behaviors exhibited by the hypnotized and non-hypnotized children. In both the groups, children under hypnosis exhibited lesser resistance to the administration of local anesthesia as compared to children who were not under hypnosis. In Group I, 30% children under hypnosis exhibited resistance to local anesthesia in the form of high hand movements, leg movements, crying or verbal protests, and/or orophysical resistance, as compared to 60% of non-hypnotized children who exhibited resistance to local anesthesia. In Group II, 20% children under hypnosis exhibited resistance to local anesthesia as compared to 80% of non-hypnotized children who exhibited resistance ($P < 0.05$). These findings are consistent with those observed by Gokli *et al.*,^[9] who found hypnotized participants demonstrated fewer undesirable behaviors and found decreased crying to be statistically significant in hypnotized patients as compared to non-hypnotized participants. This difference in behavior between hypnotized and non-hypnotized patients could be attributed to the relaxed state of mind of the child,^[9] increased pain tolerance threshold after/upon hypnosis^[10] or the child being too involved in focusing on the instructions being given by the dentist, to notice the slight prick of the needle. Similar results were also observed by Adeline Huet *et al.*^[10], who studied 30 children aged 5–12, in two groups receiving hypnosis (H) or not (NH) at the time of local anesthesia. They found that the mean modified Yale preoperative anxiety scale score was 50% lower in the H group than in the NH group at the time of anesthesia and significantly more children in the H group had no or mild pain.

No significant change in the oxygenation levels was noted for both the groups during any of the sessions [Table 1]. This finding is in agreement with the study carried out by Gokli *et al.*^[9] where no significant difference was noted between the oxygenation levels of patients, before and after hypnosis. They reasoned that since none of the procedures used affected the airway or the patient's respiratory efforts and no oxygenation was introduced, it was expected that oxygen saturation would remain unchanged.

When the change in pulse rate was compared between the hypnotic and non-hypnotic states, a statistically significant difference was noted [Table 1]. Pulse rate was seen to be lower in participants after hypnotization by 14 beats per minute (bpm) and remained lower than baseline even on the administration of local anesthesia, whereas pulse rate was seen to increase by 4 bpm after administration of local anesthesia in non-hypnotized patients [Table 1]. Similar results were found by Gokli *et al.*^[9] who found that pulse rate decreased at the time of injection in hypnotized

patients by 4 bpm, while it increased by 10 bpm in non-hypnotized patients. They attributed this change to the hypnotized patient's relaxed state, their attention being successfully held, even during the physical stimulation of injection. The non-hypnotized patients, whose attention was not directed, reacted as expected to the minor discomfort of injection. Similar results have been demonstrated on adult patients^[11] requiring surgical removal of mandibular third molars, in whom average heart rate at operation (which was taken to be an indicator of stress) was found to be significantly lower in the hypnosedation group at 74.8 beats per minute (bpm) compared to 86 bpm in the control group ($P < 0.001$, significant).

In the present study, statistically significant relation ($P < 0.05$) between gender and resistance shown was found in only 1 group, that is, in Group I, in the non hypnotic appointment, four males out of five did not show any resistance on the administration of local anesthesia, whereas all five females showed resistance [Table 2]. More studies with a larger sample size are required to get conclusive results on any association between gender and response to hypnosis.

In the present study, no significant difference was found due to treatment order. Studies with a larger sample size may reveal some association between the same.

In the present study, no significant relation was found between age and effect of hypnosis [Table 3]. This was in contrast to the study conducted by Gokli *et al.*^[9] who found that the effect of hypnosis was more pronounced in younger children (4–6 years of age), and they suggested that it was due to the younger children's ability for curiosity and intense imaginative involvement in the hypnotic suggestion. Similar results were also found in medical literature.^[12] Difference in results could be due to the fact that the present sample consisted of children above 6 years of age as the Stanford hypnotic scale is not applicable on younger children. The difference in results could also be due to the relatively small sample size in the present study. More studies with larger sample size may reveal positive results on any association between age and response to hypnosis, as a general trend was noted in this relatively small sample.

Similar studies should be carried out, with larger patient samples and different variables, as the use of hypnosis can directly influence the quality of oral care provided to children and can help in improving patient cooperation on recall appointments. It can also help in instilling a positive attitude toward seeking out professional help in oral problems. Despite promising results

seen in studies, the use of hypnosis by dental clinicians is very limited. This could be due to the lack of knowledge about the procedure and lack of formal training given during dental school. Furthermore, it requires time and patience on the part of the clinician. Hypnosis does not work if the patient is unwilling or resistant to participate. There are also a lot of myths and misconceptions that patients may hold about hypnosis, often based on things patients may have seen on television or in the movies. A thorough and accurate understanding of hypnosis is critical for obtaining both patient's informed consent and increasing their comfort with the procedure.

Although it shows good results, the use of hypnosis does require extra time and the availability of a quiet and isolated operatory, which should be factored in a while keeping dental appointments.

CONCLUSIONS

The use of hypnosis can lead to lesser resistance exhibited by children on the administration of local anesthesia. It can also lead to lesser anxiety and a more relaxed patient as exhibited by lowered pulse rate levels. Hypnosis can be a good and viable option to eliminate the relational discomfort created during the administration of local anesthesia, thus making the child more cooperative to dental procedures.

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