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The comparison of pain, stress and vital signs in patients while extracting teeth with and without Nitrous Oxide (N₂O) and Oxygen (O₂)

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ABSTRACT

Pain has long been among the human's main problems and effective steps have been taken towards relieving it. Toothache is among the hardest pain to endure and everyone is likely to experience it in his lifetime. Severe toothache brings about stress responses and has harmful effects on the patient involved. Considering the bad effects of the pain, the present study aims at finding the efficacy of using Nitrous Oxide and Oxygen (N₂O-O₂) in extracting teeth and making this a common method in Iran. In the present study as many as 20 patients were chosen who had some teeth to be extracted following their referrals to Tabriz Faculty of Dentistry. The patients were divided into two groups. All the facilities and requirements necessary were equal for both groups and some teeth were extracted using the common methods of local anesthesia and some teeth were extracted using Nitrous Oxide. The average results obtained indicate that, in comparison with local anesthesia, using Nitrous Oxide causes to relieve stress, pain, and other vital signs including blood pressure (either before or after the operation) and the number of pulses among the patients studied. However, statistically speaking the difference was not significant. According to the findings of the present study, in comparison with local anesthesia, Nitrous Oxide is more effective in relieving the pain and thus it is more effective in controlling pain, stress, and other vital signs.

Key words: toothache, stress, Nitrous Oxide, local anesthesia

INTRODUCTION

Pain relief has long been one of the human's main concerns and preoccupations and the human has to wait until the mid-nineteenth century to relieve his pains effectively. Dental pain is among the most severe pains and dentistry has assigned this major responsibility to the dentists to relieve and ultimately remove this pain in the patients.

There are still cases wherein pain control is impossible or some methods are unavoidably used which are not desirable. For example in treating severe abscesses which are accompanied by severe swelling in jaws, the dentists generally have to operate on the abscess antigen and drainage while extracting the teeth. Although this operation is accompanied by xylocaine injection, it is still painful.

The dentists also have lots of problems in dealing with young kids suffering from needle phobia and refuse to have any kind of local anesthesia injection. The dental treatment is sometimes impossible as for young kids. Besides the

local anesthesia injection creates an unpleasant experience on someone which makes it hard to control him/her in the following sessions.

As it's clear, the local anesthetics have a significant place in dentistry, since they help the dentists relieve the pain while performing dental treatments. However, in some cases it's impossible to use these drugs and the treatment is accompanied by pain (for example the abscess areas). Thus with the progress of dentistry one must search for a solution to compensate for the limitations of local anesthesia.

Besides the patients' stress and anxiety on the dental chairs is something that needs a therapy beyond the common psychotherapy.

Today short-term anesthesia on the dental chairs using new materials such as etomidate and propofol are easily done and relieve the severe pains the abscess patients suffer while being operated.

Also using Nitrous Oxide and Oxygen together with local anesthesia have relieved the patients' fear, stress, and anxiety during the dental treatment in most dental treatment centers around the world.

However the importance of Nitrous Oxide as well as Oxygen has not been realized in Iranian scientific centers and they are unknown to dentistry students and dentists as well. In dentistry this gas is used with Oxygen and in most European countries as well as America its usage is common in dentists'. The aim of using Nitrous Oxide in dentistry is relief and stress and anxiety relief and elevates the patient's pain threshold during the dental treatments. Thus the present study aims at finding out more about Nitrous Oxide (N₂O), identifying its limitations and its indications in Iranian dentistry, and popularizing its advantages and disadvantages as well as its limitations.

MATERIALS AND METHODS

Having chosen 20 patients and acquiring their consent, the test was performed in two sections of Tabriz Faculty of Dentistry. The conditions for entering the test were similar for both sections and they are as follows:

- Aged 20-40
- Having normal physical condition
- The kind of dental treatment for all the patients of the two sections was the same and extraction was chosen for all the patients
- Average educational background (having at least reading and writing abilities)
- Average social background
- Normal general health conditions

The first group was treated using conscious sedation with O₂-N₂O. Having prepared the patient including fixing the nose mask and attaching oxygen pipe N₂O was gradually added using the anesthesia machine (O₂ %80, N₂O %20). When the amount of N₂O used reached a sufficient level, the dentist extracted the tooth. Then the patient was cut off of the N₂O, and for about 5 minutes pure oxygen was given to the patient so that his lungs were washed up and the risk of hypoxia was avoided. In this group all the patients expressed their complete satisfaction, and in comparison to their previous experiences, they marinated that it was a much better method. In this method, the patients were totally conscious (from the very beginning till the end of the treatment) and they had the necessary cooperation with us and could answer all our questions.

As for the second group only local anesthesia was injected and after a while the tooth was extracted. In this group extraction was accompanied by a little pain in some cases, but the patients' stress was a little more than the first group.

RESULTS AND DISCUSSION

The frequency distribution on the patients' observed

According to the gender frequency distribution, male patients accounted for %60 and female patients accounted for %40 of all the patients. The patients' age index of dispersion was 33.85 in the present study. The patients' minimum age was 23 and the maximum was 56.

The comparison of feeling pain in the groups

Table 2 illustrates the pain feeling mean in group 1 (Nitrous Oxide) and group 2 (local anesthesia) using Mann Whitney's U test. The pain feeling mean is equal to 27 in group 1 (Nitrous Oxide), with the standard deviation of 18.88. The pain feeling mean is equal to 29 in group 2 (local anesthesia), with the standard deviation of 17.82. The mean rank is equal to 10.5 in group 1 and 10.95 for group 2, U=45.5 with the level of significance as p=0.739. The difference was the same for the groups, and there was no significant difference.

Table 1. Comparing the Pain Feeling in Group 1 and 2

Variables	Number	Mean	Standard Deviation	Standard Error	Rank Mean	U	C
Group 1	10	27	18.88	5.97	10.05	45.5	0.739
Group 2	10	29	17.28	5.46	10.95		

Comparing stress in the patients of the present study

Table 2 illustrates the stress mean in the groups studied. The stress mean of group 1 (Nitrous Oxide) is equal to 30 with the standard deviation of 14.9. The mean stress of group 2 (local anesthesia) is equal to 40 with the standard deviation of 24.94. The stress rank mean of group 1 is 9.4 and it is 11.6 for group 2; U=39 with the level of significance as p=0.43. Thus the stress was equal in both groups and there is no significant difference.

Table 2. Comparing the Stress among the patients in Group 1 and 2

Variables	Number	Mean	Standard Deviation	Standard Error	Rank Mean	U	C
Group 1	10	30	14.90	4.71	9.40	39	0.43
Group 2	10	40	24.94	7.88	11.60		

Comparing preoperative and postoperative blood pressure in the groups of the patients of the present study

The findings of table 3 illustrates that the blood pressure mean of the groups studied. The preoperative blood pressure of group 1 (Nitrous Oxide) is equal to 121.79 with the standard deviation of 8.79. The preoperative blood pressure mean of group 2 (local anesthesia) is equal to 119.76 with the standard deviation of 7.41. The rank mean of preoperative blood pressure of group 1 is 11.6 and it is 9.4 for group 2; U=39 with the level of significance as p=0.436. Thus the preoperative blood pressure was equal in both groups and there is no significant difference.

Moreover the postoperative blood pressure of group 1 (Nitrous Oxide) is equal to 119.74 with the standard deviation of 2.34. The postoperative blood pressure mean of group 2 (local anesthesia) is equal to 127.81 with the standard deviation of 6.78. The rank mean of postoperative blood pressure of group 1 (before the operation) is 7.5 and it is 13.5 for group 2; U=20 with the level of significance as p=0.023. Thus the postoperative blood pressure is equal in both groups and there is no significant difference.

Table 3. Comparing the preoperative and postoperative blood pressure in the groups of patients

Variables	Number	Mean	Standard Deviation	Standard Error	Rank Mean	U	C
Group 1 (preoperative blood pressure)	10	121.79	8.79	2.78	6	39	0.436
Group 2 (preoperative blood pressure)	10	119.76	7.41	2.34	9.4		
Group 1 (postoperative blood pressure)	10	119.74	7.41	2.34	7.5	20	0.023
Group 2 (postoperative blood pressure)	10	127.81	6.78	2.14	13.5		

Comparing preoperative and postoperative pulse rate

The findings of table 4 illustrates preoperative and postoperative pulse rate in the groups studied. The preoperative pulse rate of group 1 (Nitrous Oxide) is equal to 76.9 with the standard deviation of 7.75. The preoperative blood pressure mean of group 2 (local anesthesia) is equal to 76.9 with the standard deviation of 6.4. The rank mean of preoperative pulse rate of group 1 is 10.5 and it is 10.95 for group 2; U=45.5 with the level of significance as p=0.739. Thus the preoperative pulse rate was equal in both groups and there is no significant difference.

The postoperative pulse rate of group 1 (Nitrous Oxide) is equal to 73.9 with the standard deviation of 6.82. The postoperative blood pressure mean of group 2 (local anesthesia) is equal to 83.8 with the standard deviation of 7.99. The rank mean of postoperative pulse rate of group 1 is 7.25 and it is 13.75 for group 2; U=45.5 with the level of significance as p=0.739. Thus the postoperative pulse rate was equal in both groups and there is no significant difference.

Table 4. Comparing preoperative and postoperative pulse rate

Variables	Number	Mean	Standard Deviation	Standard Error	Rank Mean	U	C
Group 1 (preoperative blood pressure)	10	76.90	7.75	2.45	10.5	45.5	0.73
Group 2 (preoperative blood pressure)	10	76.90	6.48	2.05	10.95		
Group 1 (postoperative blood pressure)	10	73.90	6.82	2.15	7.25	17.5	0.11
Group 2 (postoperative blood pressure)	10	83.80	7.99	2.52	13.75		

DISCUSSION

According to the studies done and the findings obtained one can conclude that using either of the two methods has its own advantages and each method elevates the dentist's success in achieving the patients' satisfaction and trust. On the other hand we all know that the most common reason for death is now ischemic cardiovascular diseases. Tension and mental and nervous pressures are the most dangerous factor that results in such diseases. The dentists' offices have long been one of the most stressful environments. Even nowadays although there are advanced and developed scientific techniques towards pain control, it is likely that some patients are still afraid of dental chairs. Applying the techniques of conscious sedation using (N₂O+O₂) in dentistry has reduced these tensions and thus the patients will have more trust in new sciences.

For creating conscious sedation, the first group proved to be better than the second. However in the first group through creating anesthesia with N₂O+O₂, the dentist can perform various treatments on the patients, since the analgesia created is significant enough and the oxygen is even more than the surrounding air we breathe in (around %20), and thus there is no risk of hypoxia (in this method N₂O does not exceed %50).

Having inhaled the mixture, when it deemed necessary, the dentist can use local anesthesia for painful operations like extraction and oral operations, and in this case the local anesthesia injection is painless. Using this method in children's dentistry for pain control has proved to be successful. Using this method creates peace and trust in the kid, and gives the dentist enough time to perform the dental treatments.

However using this technique in dental abscess treatment has not been successful, since it does not bring about enough analgesia and it is suggested that other analgesic drugs petizusin and phantamil to be applied or other short term anesthesia techniques to be used on the dental chair.

For controlling mentally retarded patients the best method is using short-term anesthetics, since it was performed in Jaw and Face Section of Imam Khomeini Hospital and all the case reported to be successful.

Last but not least one can maintain that these studies and researches are more valuable with respect to their educational value than their research and statistic aspects, since there were plenty of problems and challenges including facilities and time restraint which prevent more comprehensive studies.

Finally, based on the previous studies and the results obtained from the present study, one can conclude that using either of the two methods has its own advantages and each method elevates the dentist's success in achieving the patients' satisfaction and trust.

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