ORIGINAL RESEARCH

Evaluation of the Safety Profile of Dexmedetomidine and Nitrous Oxide for Paediatric Dental Sedation

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Received: 19 March, 2024 Accepted: 16 April, 2024

ABSTRACT
Background: This study was conducted for the Evaluation of the Safety Profile of Dexmedetomidine and Nitrous Oxide for Paediatric Dental Sedation**. Material and methods**:This study comprised 50 children aged four to eight years who visited the outpatient department of Pedodontics and Preventive Dentistry. The study included healthy children with dental problems, as well as those who were frightened and apprehensive, regardless of gender or socioeconomic position. Children were distributed evenly between the two groups at random. Group one comprised of subjects receiving Dexmedetomidine while the 2nd group comprised of subjects receiving nitrous oxide. **Results**: In this study there were 25 subjects in both the groups each. There were 25 males and 25 females. The statistical analysis between groups 1 and 2 was performed using SPSS v1.2, with the Chi-square test and Student t test. The heart rate had a significantly significant p-value (<0.001). The second group's heart rate was substantially higher throughout the process than the first group. The p-values for systolic and diastolic blood pressure were both <0.001, indicating a significant difference between the groups. The second group had higher blood pressure than the other group. The differences in oxygen saturation between the two groups were inconsequential, with a p-value of >0.05. Throughout the operation, both groups maintained saturation levels of at least 95%. **Conclusion**: Dexmedetomidine had a better efficacy over nitrous oxide.
Keywords: Dexmedetomidine, nitrous oxide, sedation

INTRODUCTION

In paediatric dentistry, minimizing anxiety in children is an extremely challenging but is necessary. A child's cooperation with a dental procedure usually requires various behavioral management strategies conveyed by the entire dental team. If these strategies prove inadequate, the application of some form of pharmacological sedation or general anesthesia is indicated.

The benefits of administering general anesthesia must always be weighed against the risks. Its previously reported post-operative complications include arrhythmias, dislodged or obstructed endotracheal tube, IV infiltration or disconnection, edema of the tongue or lips, and nasal bleeding, which could range from negligible to severe (90%).[1] However, nowadays, the rise of sedation, anxiety, and unwanted movement of children during dental procedures has markedly reduced.[2]

Sedation depresses the level of consciousness but allows the patient to respond appropriately to verbal commands and light tactile stimulation.[3] In dentistry, it has been used in the treatment of children or adults

with high anxiety levels, thus optimizing the success of dental procedures.

This study was conducted for the Evaluation of the Safety Profile of Dexmedetomidine and Nitrous Oxide for Paediatric Dental Sedation

MATERIAL AND METHODS

This study comprised 50 children aged four to eight years who visited the outpatient department of Pedodontics and Preventive Dentistry. The study included healthy children with dental problems, as well as those who were frightened and apprehensive, regardless of gender or socioeconomic position. Children were distributed evenly between the two groups at random. Group one comprised of subjects receiving Dexmedetomidine while the 2nd group comprised of subjects receiving nitrous oxide.

RESULTS

Table 1: Number-wise distribution of subjects.

Groups	Number of subjects	Percentage
Group 1	25	50%
Group 2	25	50%
Total	50	100%

25 subjects belong to group 1 and 25 subjects were there in the 2nd group.

Table 2: Gender-wise distribution of subjects.

Gender	Number of subjects	Percentage
Males	25	50%
Females	25	50%
Total	50	100%

25 subjects were males and 25 subjects were females.

The statistical analysis between groups 1 and 2 was performed using SPSS v1.2, with the Chi-square test and Student t test. The heart rate had a significantly significant p-value (<0.001). The second group's heart rate was substantially higher throughout the process than the first group. The p-values for systolic and diastolic blood pressure were both <0.001, indicating a significant difference between the groups. The second group had higher blood pressure than the other group. The differences in oxygen saturation between the two groups were inconsequential, with a p-value of >0.05. Throughout the operation, both groups maintained saturation levels of at least 95%.

DISCUSSION

It has been reported that α2-adrenoreceptor agonists cause sedation, anxiolysis, analgesia, an antisialogogue effect, sympatholytic, and postoperative reduction of nausea and vomiting better than benzodiazepines. Orally and intranasally administered clonidine has a slow onset of action, resulting in a half-life of 12.5 h.[4,5] In children, its plasma concentration peaks 60–90 min post oral administration. Hence, clonidine needs to be administered at least 1 h before the induction of anesthesia.[6,7]

Dexmedetomidine was first approved by the Food and Drug Administration in 1999 for the sedation of intensive care unit patients and for premedication. In 2005, it was introduced to dentistry.[8] Dexmedetomidine is a more selective and specific α2-adrenoreceptor agonist than clonidine. Dexmedetomidine is 8 times more specific than clonidine and has a shorter half-life. Consequently, dexmedetomidine has more favorable pharmacokinetic properties than clonidine.

This study was conducted for the Evaluation of the Safety Profile of Dexmedetomidine and Nitrous Oxide for Paediatric Dental Sedation

In this study there were 25 subjects in both the groups each. There were 25 males and 25 females. The statistical analysis between groups 1 and 2 was performed using SPSS v1.2, with the Chi-square test and Student t test. The heart rate had a significantly significant p-value (<0.001). The second group's heart rate was substantially higher throughout the process than the first group. The p-values for systolic and diastolic blood pressure were both <0.001, indicating a significant difference between the groups. The second group had higher blood pressure than the other group. The differences in oxygen saturation between the two groups were inconsequential, with a p-value of >0.05. Throughout the operation, both groups maintained saturation levels of at least 95%.

Ilasrinivasan V et al (2018)[9] compared nitrous oxide-oxygen inhalation and low dose oral midazolam-ketamine combination for anxiolysis in the management of children aged between 3 to 10 years for dental treatment.A comparative clinical study with equal number of subjects in both the groups evaluating efficacy of oral ketamine-midazolam combination and nitrous oxide-oxygen inhalation in children with Frankl behavior rating score 2 and ASA1.A total of 30 children were equally divided into 2 groups, oral midazolam-ketamine (MK) group which received 0.25mg/ kg midazolam with 3mg/kg ketamine in combination and the Nitrous oxide-oxygen (N) group which received nitrous oxide-oxygen inhalation. The parameters evaluated were the drug/ mask acceptance, need for the use of a physical restraint. Houpt's sedation scale, faces pain score, sedation duration, time taken to achieve the maximum sedation and adverse reactions were assessed. Student t-test was used for comparison between the groups and proportions were compared using Chi-square test.The results found no statistically significant differences between the groups in all the parameters except for the duration of sedation and the time taken to achieve maximum sedation which were higher in oral MK group than the Nitrous-oxide oxygen inhalation group.Both oral-midazolam and ketamine combination and nitrous oxide-oxygen inhalation sedation were found to have similar clinical success among 3 to 10-year-old children in bringing about anxiolysis during dental treatment.

Unkel JH et al (2021)[10]compared the safety of three different sedation regimens for pediatric dental procedures to examine the safety of intranasal dexmedetomidine paired with nitrous oxide (N_2O). This was a retrospective chart review of 149 three-to six-year-old healthy patients who underwent sedation to complete dental treatment. Forty-nine patients received intranasal dexmedetomidine with nitrous oxide (DEXNO), 47 received oral midazolam with nitrous oxide (MIDNO), and 53 received oral midazolam and oral hydroxyzine with nitrous oxide (MIDHYXNO). Demographic data, procedural times, vital signs, and adverse events were recorded. No patients in any of the three groups experienced major adverse events. All groups experienced some degree of hypotension. One of the 49 DEXNO cases experienced bradycardia intraoperatively. No cases required clinical intervention. This pilot study suggested that intranasal dexmedetomidine with nitrous oxide is a safe sedation regimen for pediatric procedures, comparable to combinations of oral midazolam with nitrous oxide and oral midazolam and oral hydroxyzine with nitrous oxide.

CONCLUSION

Dexmedetomidine had a better efficacy over nitrous oxide

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