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INTRANASAL DEXMEDETOMIDINE AS CONSCIOUS SEDATION IN SURGICAL EXTRACTION OF IMPACTED TEETH

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ABSTRACT

BACKGROUND & OBJECTIVES

The handling of a patient's worry and concern before surgery has long been an important aspect of patient care. Conscious sedation techniques can considerably reduce the need for general anaesthesia for minor oral surgical operations. Among different drugs used for conscious sedation, Dexmedetomidine is chosen because it causes less respiratory depression, easy arousal of the patient and analgesic sparing properties. Use of Intranasal medications for dental procedures is easy and effective. The nasal Atomiser device delivers intranasal medication in a fine mist which ensures the exact dose and volume delivered, enhances absorption improves bioavailability for fast and effective drug delivery.

METHOD

The study was carried out in 10 patients. Patients with impacted mandibular third molars were chosen for the study. All the patients were administered intranasal Dexmedetomidine, through Mucosal Automiser Device 30 mins before the procedure. Patients were evaluated for Sedation and Pain, Sedation at 30 mins and 60 mins intra operatively using Observer's Assessment of Alertness/Sedation (OAA/ S) and Pain at baseline and 30 mins and 60 mins intra operatively using Visual Analogue Scale. Patient's vitals such as Blood Pressure, Heart Rate and Oxygen Saturation was monitored continuously.

RESULTS

All cases showed significant sedation ($p<0.05$) with OAA/S score at 30 mins intra-operatively. In two out of ten patients, VAS score was reduced at 60mins.

CONCLUSION
This study aimed to evaluate the efficacy of Intranasal Dexmedetomidine for achieving conscious sedation in patients. Significant Sedation ($p<0.05$) was achieved at 30mins intraoperatively. Hence we conclude by saying that, Dexmedetomidine given intranasally is a non-invasive and effective way to achieve sedation in patients undergoing procedures under local anesthesia in order to reduce the anxiety of the patient related to the procedure.

KEYWORDS
Conscious Sedation, Intranasal, Dexmedetomidine, Mandibular Third Molars, Surgical Removal.

INTRODUCTION

For a long time, it has been common practice to administer medications intranasally for the symptomatic alleviation, prevention, or treatment of topical nasal diseases. It is now accepted that intranasal drug administration is a dependable and practical alternative to oral and parenteral methods. Recently, systemic drug delivery through the nasal mucosa has become a seriously viable therapeutic route that crosses the blood-brain barrier enabling direct medication delivery of central nervous system (CNS)-active substances during the biophase. It is brought about by the architectural, physiological, and histological features of the nasal cavity - the neuroepithelium, which offer the possibility for speedy systemic drug absorption and activation. When compared to drug bioavailability obtained after gastrointestinal absorption, intranasal absorption improves drug bioavailability by avoiding the gastrointestinal and hepatic presystemic metabolism. The pharmaceutical industry's unneeded sterilisation of nasal preparations, non-invasiveness, convenience of drug distribution, patient compliance and generally painless nature.[1] Dexmedetomidine is a potent alpha-2-adrenergic agonist, more selective than clonidine, with widespread actions on the mammalian brain that include sedation, anaesthetic-sparing, analgesia and sympatholytic properties.[2] It has analgesic, anxiolytic, sympatholytic, and opioid-sparing properties.

It induces a unique sedative response, which shows an easy transition from sleep to wakefulness, thus allowing a patient to be cooperative and communicative when stimulated, produces less delirium than other sedatives or even prevents delirium. As an anaesthetic adjuvant, dexmedetomidine decreases the need for opioids, inhalational anaesthetics, and intravenous anaesthetics. The sympatholytic effect of dexmedetomidine may provide stable hemodynamics during the perioperative period.[3] Concious Sedation a drug Induced State of depression of consciousness enabling the treatment to be carried out, during which verbal contact is maintained with the patient either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.[4] Dexmedetomidine-induced cooperative sedation with minimal respiratory depression provides safe and acceptable conditions during neurosurgical procedures in awake patients and awake fiberoptic intubation.[5]
Conscious sedation techniques can considerably reduce the need for general anaesthesia for minor oral surgical operations.

The gradual evolutionary reduction in the size of the human mandible/maxilla has resulted in too small a mandible/maxilla that may lead to less space for the third molars ans are also the last to erupt with a relatively high chance of becoming impacted. Hence, the surgical extraction of these impacted teeth has become the most common dentoalveolar surgeries.[6]

Several minor surgical procedures that can be performed under local anaesthetic can be quite painful for the patient. On the other hand, general anaesthesia necessitates a more specialised operatory setup, precise monitoring, and higher treatment costs. Some anesthesia-related complications, such as PONV, sore throat, and dental damage, cause significant patient distress but do not result in long-term morbidity. However, cardiac, respiratory, and renal perioperative problems are linked to long-term morbidity and death. Both the healthcare system and the patients bear the financial burden of all

complications. Conscious sedation is a critical component of pain and anxiety management. Conscious sedation techniques can considerably reduce the need for general anaesthesia for minor oral surgical operations.

Aim

The aim of the study is to assess the efficacy of intranasal dexmedetomidine as conscious sedation in surgical removal of impacted teeth.

Objective

To evaluate the efficacy of dexmedetomidine as an intranasal agent in conscious sedation.

MATERIALS AND METHODS

This study was performed after obtaining approval from the institutional ethics committee [KCDSEC/OS19/2022-2023] and informed consent from all patients.

10 patients with impacted mandibular third molars who were indicated for surgical extraction in the age group 17 to 55 years and willing to participate in the study were included and randomly selected by toss of coin.

Those who were medically compromised, who had pre-existing infections related to the third molar, and those who were not willing to participate in the study were excluded from the study.

Methods

1. Mucosal Automiser Device.
2. Dexmedetomidine Hydrochloride Injection (100mcg).

Procedure

All patients were informed about the study and consent was taken for the same.

Patients in the study were administered 100mcg Dexmedetomidine, in the dosage of 1.5mcg per kg 30 minutes prior to the surgical procedure in reclining positing. As a precaution for using a sedative drug, patients were instructed to maintain 4 hours NPO pre-operatively.

After 30minutes of administering intranasal Dexmedetomidine, Surgical Extraction of impacted mandibular 3rd molar is carried out, following standard surgical protocol. i.e After Aseptic preparation, Local anaesthesia, (lignocaine: adrenaline 1:80,000) was administered (Inferior Alveolar Nerve Block, Lingual Nerve and Long Buccal nerve). A modified ward's incision was given and a mucoperiosteal flap was reflected. Bone guttering was carried out, tooth was sectioned if necessary. After complete tooth removal, the residual follicle was removed, haemostasis was achieved and primary closure of the flap was done using 3'0 silk.

The patient's Blood Pressure, Heart Rate, SpO2 are monitored continuously.

Patients were assessed for sedation using the Observer's Assessment of Alertness/Sedation (OAA/ S) 13 scale, for pain, Using the Visual Analogue scale at 30mins and 60mins. The type and difficulty of impaction were considered (winters classification).

Modified Observer's Assessment of Alertness/ Sedation Scale

6 Appears alert and awake, responds readily to name spoken in normal tone.
5 Appears asleep but responds readily to name spoken in normal tone.
4 Lethargic response to name spoken in normal tone.
3 Responds only after name is called loudly or repeatedly.
2 Responds only after mild prodding or shaking.
1 Does not respond to mild prodding or shaking.
0 Does not respond to noxious stimulus.

Pain

Assessed using visual Analogue scale every 15 minutes throughout the study.

Winter's Classification:

Preparation of the Intranasal Dexmedetomidine

Each ml of the drug contains 100mcg of Dexmedetomidine and the dosage is 1.5mcg/kg, and the intranasal solution was prepared by

$$\frac{1.5 * \text{Weight of Patient in Kgs}}{100} = \text{Volume of the drug to be taken in ml}$$

The above volume of solution was diluted with saline to make it into 1ml. Equal volumes of the prepared solution were then sprayed into both nostrils of the subjects in the reclined position, using a mucosal atomisation device 30 minutes before the procedure.

Each observation period lasted for 60 min. The investigations were performed in a fully equipped operating room with full resuscitation facilities.

RESULTS

Patients

A total of 10 participants were recruited in this study, with a mean age of 29.70 ± 9.358 years (range, 17 - 50 years), of which 40% (n= 4) were males and the rest were females (n=6) (Table 1).

Sociodemographic Details		
Sex	**Frequency**	**Percent**
Males	4	40.0
Females	6	60.0
Total	**10**	**100.0**
Age	**Mean**	**SD**
Mean Age (yrs)	29.70	9.358

Table 1: Distribution of subjects based on Gender

Type of Impaction

Among 10 patients 2 patients had vertically impacted mandibular third molar, 5 of them had mesio-angularly impacted, 2 of them had disto- angularly impacted, and 1 of them has horizontally impacted. (Table 2).

Impaction Type	**Frequency**	**Percent**
Vertical	2	20.0
Mesio-angular	5	50.0
Disto-angular	2	20.0
Horizontal	1	10.0

Total	**10**	**100.0**

Table 2: **Type of Impaction**

Pederson Difficulty Score

The Peterson difficulty score for 2 of the patients was 5.00±.000, 5 of patients was 3.60±.548 (range 3 - 4), 2 of patients was 7.00±.000, 1 patient had 6.00, overall average is 4.80±1.476 (Table 3).

Type of Impaction		**Difficulty Scores**		
	N	**Mean ± SD**	**Minimum**	**Maximum**
Vertical	2	5.00±.000	5	5
Mesio-angular	5	3.60±.548	3	4
Disto-angular	2	7.00±.000	7	7
Horizontal	1	6.00	6	6
Overall	10	4.80±1.476	3	7

Table 3: **Pederson Difficulty Score**

Mean Sedation at 30 minutes - Intra-operative

At 30 mins intra-operatively, 8 Out of 10 patients, had a Observer's Assessment of Alertness/ Sedation Scale score of 5, and two of them had a score of 6 - which was vertical and disto-angular. (Table 4)

Type of Impaction	**Sedation Scores at 30 minutes**			
	N	**Mean ± SD**	**Minimum**	**Maximum**
Vertical	2	5.50±.707	5	6
Mesio-angular	5	5.00±.000	5	5
Disto-angular	2	5.50±.707	5	6
Horizontal	1	5.00	5	5
Overall	10	5.20±.422	5	6

Table 4: Mean sedation scores based on the type of impaction at 30 minutes intra-operatively

Mean Sedation at 60 minutes - Intra-operative

At 60 mins intra-operatively, 5 Out of 10 patients, had a Observer's Assessment of Alertness/ Sedation Scale score of 5, and five of them had a score of 6 - of which two were vertical, two were mesio-angular and one was disto-angular. (Table 5)

Type of Impaction		Sedation Scores at 60 minutes		
	N	Mean ± SD	Minimum	Maximum
Vertical	2	6.00±.000	6	6
Mesio-angular	5	5.40±.548	5	6
Disto-angular	2	5.50±.707	5	6
Horizontal	1	5.00	5	5
Overall	10	5.50±.527	5	6

Table 5: Mean sedation scores based on the type of impaction at 60 minutes intra-operatively

SD- Standard Deviation

Pairwise comparison		Sedation Scores		
		Mean difference	Test statistic	p-value
Vertical Impaction				
Baseline	30 minutes	.500	2.000	.368
	60 minutes	.000		
30 minutes	60 minutes	-.500		
Mesio Angular Impaction				
Baseline	30 minutes	.400	4.000	.135
	60 minutes	.000		
30 minutes	60 minutes	-.400		
Disto Angular Impaction				
Baseline	30 minutes	.000	.000	1.000
	60 minutes	.000		
30 minutes	60 minutes	.000		

Horizontal Impaction				
Baseline	30 minutes	.000	.000	1.000
	60 minutes	.000		
30 minutes	60 minutes	.000		

Table 6: Mean comparison of the change in sedation over three time periods based on the type of impaction

Kruskal Wallis Test with Bonferroni's correction, Level of significance at $p \leq 0.05$.

Mean Pain Score at 30 minutes - Intra-operative

At 30 mins intra-operatively, two Out of 10 patients had a Visual analogue scale of 3 - which was mesio-angular, and vertical impaction, five of them had a VAS score of 4 in which 3 of them were mesio angular one horizontal and one distoangular. Two of them had a VAS score of 5, of which one was horizontal and one was disto angular. One of them had a VAS score of 6, who had a vertical impaction. (Table 7)

Type of Impaction		**Pain (VAS) Scores at 30 minutes**		
	N	**Mean±SD**	**Minimum**	**Maximum**
Vertical	2	4.50±2.121	3	6
Mesio-angular	5	4.00±.707	3	5
Disto-angular	2	4.50±.707	4	5
Horizontal	1	4.00	4	4
Overall	10	4.20±.919	3	6

Table 7: Mean pain (VAS) scores based on the type of impaction at 30 minutes intra-operatively

SD- Standard Deviation

Mean Pain Score at 60 minutes - Intra-Operative

At 60 mins intra-operatively, one Out of 10 patients had a Visual analogue scale of 3 - which was mesio-angular, four of them had a VAS score of 4 in which 2 of them were vertical, one horizontal and one mesio-angular. Four of them had a VAS score of 5, of which two were mesioangular, one was horizontal and one was disto angular. One of them had a VAS score of 6, who had a mesio-angular impaction. (Table 8)

Pairwise comparison		Pain (VAS)		
		Mean difference	Test statistic	p-value
Vertical Impaction				
Baseline	30 minutes	.000	.000	1.000
	60 minutes	.500		
30 minutes	60 minutes	.500		
Mesio Angular Impaction				
Baseline	30 minutes	.000	2.000	.368
	60 minutes	-.600		
30 minutes	60 minutes	-.600		
Disto Angular Impaction				
Baseline	30 minutes	.000	.000	1.000
	60 minutes	.000		
30 minutes	60 minutes	.000		
Horizontal Impaction				
Baseline	30 minutes	.000	2.000	.368
	60 minutes	-1.000		
30 minutes	60 minutes	-1.000		

Table 8: Mean comparison of the change in pain (VAS) over three time periods based on the type of impaction

Kruskal Wallis Test with Bonferroni's correction, Level of significance at $p \leq 0.05$.

Type of Impaction		Pain (VAS) Scores at 60 minutes		
	N	Mean ± SD	Minimum	Maximum
Vertical	2	4.00±.000	4	4
Mesio-angular	5	4.60±1.140	3	6
Disto-angular	2	4.50±.707	4	5
Horizontal	1	5.00	5	5
Overall	10	4.50±.850	3	6

Table 9: Mean pain (VAS) scores based on the type of impaction at 60 minutes intra-operatively

SD- Standard Deviation

DISCUSSION

The intranasal route of administration is commonly used for the topical treatment of local disorders affecting the nose and paranasal sinuses, such as allergic or infectious rhinitis, nasal polyposis, and sinusitis.

Intranasal route of drug administration has gained popularity for systemic drug administration in the recent years due to its advantages of administering compounds with poor gastro-intestinal stability, and high hepatic first pass metabolism and those that do not cross Blood Brain Barrier (BBB). This is possible because of its anatomical, physiological and histological characteristics of nasal cavity. And also from the patient's point of view, it is Non-invasive and essentially painless delivery.

Anatomically, human nasal cavity fills the space between the base of skull and roof of mouth and supported by ethmoidal bones superiorly and laterally. The maxillary and inferior conchae support laterally.

The total volume of the cavity is 15-20mL and total surface area is 150cm2.The cavity is divided into two symmetrical halves by nasal septum in the middle, the two halves open into the face through nostrils extending posteriorly to the nasopharynx.

Both the halves have 4 areas - nasal vestibule, atrium, respiratory region and olfactory region.

The nasal vestibule - the anterior most part of nasal cavity, has area of 0.6cm2 with vibrissae (nasal hairs) which filter the inhaled particles.

Covered by a stratified squamous and keratinized epithelium with sebaceous glands making it difficult for absorption of drugs in this region.

The atrium - between nasal vestibule and respiratory region, anteriorly it has stratified squamous epithelium and posteriorly it has pseudo stratified columnar cells with microvilli.

The respiratory region - also called conchae is the largest part and has superior middle and inferior turbinates which are projected on the lateral wall, between the turbinates are meatus.

Epithelium here is made of, pseudo stratified columnar cells, goblet cells, basal cells and mucous and serous glands.

Epithelial cells here are covered on their apical surface with microvilli and have cilia, they are important in enhancing the respiratory surface, while cilia transport the mucous toward the nasopharynx.

The Olfactory region - located at the roof of nasal cavity, its neuroepithelium is the only part of CNS that is exposed to the external environment. Epithelium is psuedo stratified with specialised olfactory cells and small serous glands (glands of Bowman).

Elimination of drugs when administered intra-nasally, the drug formulation will normally be cleared rapidly from the nasal cavity into the gastrointestinal tract by the mucociliary clearance system.
A quantity of the drug will be absorbed across the nasal mucosa and reach the systemic circulation from where it will be eliminated via normal clearance mechanisms.

A Mucosal Atomizer Device (MAD) delivers medications via a fine spray over a broad surface area in the nasal cavity. It also reduces sneezing and coughing compared to other devices.
The soft, conical plug on the tip forms a seal with the nostril, preventing expulsion of fluid. The spray atomizes drugs into a fine mist of particles 30-100 microns in size. Dexmedetomidine, a pharmacologically active dextroisomer of medetomidine, is a selective a2- adrenergic receptor agonist. It binds to transmembrane G protein-binding adrenoreceptors in the periphery (a2A-adrenoceptor subtype) and in the brain and spinal cord (a2B- and a2C- adrenoceptor subtypes), with a dose-dependent a2-selectivity that is approximately 7- to 8-fold greater than that of clonidine.
Dexmedetomidine also binds to imidazoline receptors, potentially explaining the non-a2-adrenoreceptor-related effects of a2-adrenergic receptor agonists. Dexmedetomidine generate, other effects such as sedation and sympatholysis, as well as having opioid-sparing properties.

Stimulation of the a2-adrenoceptor subtypes mediates sedative and antinociceptive actions (a2A) and a vasoconstrictive cardiovascular effect (a2B), and modulates dopaminergic neurotransmission, hypothermia and a variety of behavioural responses (a2C).
In addition, a-adrenergic receptor agonists activate potassium ion channels, ultimately resulting in the suppression of neuronal activity. The consequence of this is an inhibition of noradrenaline (norepinephrine) release, engendering a reduction of excitation, especially in the locus coeruleus.
The locus coeruleus is the major site of noradrenergic innervations in the brain, and has also been implicated as a key modulator in a variety of a2-adrenergic receptor agonist directed brain functions, including anxiety, arousal, sleep and the withdrawal associated with CNS depressants (e.g. opioids).
The aim of this study was to evaluate the efficacy of intranasal administration of atomized dexmedetomidine in sedation and pain in adult patients undergoing impacted third molar removal.
Our study complying of inclusion criteria of total 10 patients were included.

Out of the 10 patients, 6 patients were females, and 4 were males. The type of impaction was based on Winter's classification, and the difficulty of impaction was by the Pederson Scale.
Among them two patients had vertically impacted mandibular third molar, five of them had mesio-angularly impacted, two of them had disto-angularly impacted, and one of them had horizontally impacted.

Out of 10 patients, two patients had a Pederson score of 3, three of them had a score of 4, two of them had a score of 5, one had a score of 6, and two of them had a score of 7. 30 minutes before the procedure, Dexmedetomidine was sprayed into both the nostrils using a Mucosal Atomizer Device attached to a 2ml syringe by luer lock.
All the patients tolerated intranasal administration of dexmedetomidine. No local irritation or pain occurred with the application of this drug in any of our subjects. No subject complained of a smell or taste with intranasal drug administration.

All the patients showed similar surgical duration (i.e. time from injection to the end of the surgery). The parameters evaluated were Sedation (intra-operatively, at 30 mins and 60 mins) and Pain - (baseline intra-operatively, at 30 mins and 60 mins).
Sedation as measured by Observer's Assessment of Alertness/ Sedation Scale and Pain was evaluated using Visual Analogue Scale measured intra-operatively, at 30 mins and 60 mins by an independent observer.

At 30 mins, (after the administration of Intranasal Dexmedetomidine,) 8 patients out of 10 patients had a Observer's Assessment of Alertness/ Sedation Scale score of 5, that means "Appears asleep but responds readily to name spoken in normal tone**",** two of them had a Observer's Assessment of Alertness/ Sedation Scale score of 6, which "Appears alert and awake, responds readily to name spoken in normal tone."

At 60 mins, (after the administration of Intranasal Dexmedetomidine,) 5 patients out of 10 patients had a Observer's Assessment of Alertness/ Sedation Scale score of 5, that means "Appears asleep but responds readily to name spoken in normal tone**",** five of them had a Observer's Assessment of Alertness/ Sedation Scale score of 6, which is "Appears alert and awake, responds readily to name spoken in normal tone."

The Observer's Assessment of Alertness/ Sedation Scale had increased to 6 for three patients, of which two of them had mesio-angular impaction and one had a vertical impaction.
When compared sedation at baseline to sedation at 30 mins and sedation at 60mins, and to sedation at 30mins to sedation at 60mins, the sedation was significant with P value for vertical impaction 0. 368, Mesio-angular 0.135, Disto-angular 1.000 and horizontal 1.000 (Level of significance at $p \leq 0.05$).
At baseline, two of the patients had VAS score of 3, five of them had a VAS score of 4, two of them had a VAS score of 5, and one of them had a VAS score of 6. No Change in VAS score was noticed at 30mins, intra-operatively.

At 60min Intra-operatively, the VAS score changed as follows, One patient had a VAS score of 3, decreased by one point from the previous reading, four of they had a VAS score of 4, out of which the score had increased for one patient from 3 - (vertical impaction), decreased from 6 for a vertical impaction and remained the same for two other patients of which one was distoangular and the other was mesio-angular.

When the pain measured on Visual Analogue Scale was compared with baseline and between the two time intervals, the pain was significant with P value for vertical impaction 1.000, Mesio-angular 0.368, Disto-angular 1.000 and horizontal 0.368 (Level of significance at $p \leq 0.05$).
Similar results were achieved by Nooh et al,[7] where he studied 18 patients, with bilateral mandibular 3rd molar impaction. Each subject participated in two surgical sessions, who was randomly assigned to receive water on one side and dexmedetomidine on other side, Sedation status was assessed by a blinded observer with a modified Observer's Assessment of Alertness/Sedation (OAA/S) scale and bispectral index (BIS) every 10 min throughout the study.
Significant sedation was achieved in test group. They were inconclusive in terms of the possible analgesic effects of intra-nasal dexmedetomidine.

Shetty et al,[8] did a double blind split mouth study on 15 patients, all with third molar impactions. Patients were randomly assigned to receive intranasal saline or 1.5microgram / kg dexmedetomidine. Patients were studied for 120 mins, and sedation data was collected every 30 mins. Sedation status was assessed by a blinded observer with a modified Observer's Assessment of Alertness/Sedation (OAA/S) 13 scale. And he concluded that, sedation scores in the group with dexmedetomidine were higher. Evaluated Pain experience by Visual Analog Scale, And he concluded that, pain scores in the group with dexmedetomidine were significantly lesser.

Cheung et al[9] in his study of 30 patients achieved similar results, he administered intranasal dexmetedomidine 1.5microgm/kg and same volume of 9% saline 45 mins before surgery. All of them were operated for unilateral impacted 3rd molars under local anesthesia. Sedation scores including Observer Assessment of Alertness/Sedation (OAA/S) and NRS sedation score were also recorded as baseline and every 5 min thereafter. Bispectral index (BIS) scores were recorded from administration of intranasal study drug to the time of discharge. And concluded that, during unilateral third molar

surgery performed under local anesthesia, intranasal DEX appears to provide perioperative clinical sedation. Pain was assessed using NRS, numerical rating scale and analysed postoperative pain in two periods, namely from the 1st to 12th hour and from the 12th to 72nd hour. Postoperative pain intensity increases with the extent of surgical intervention, and this was assessed by measuring the amount of bone removed. There was no difference in this and, by inference, in the degree of trauma between the study groups. And concluded that, during unilateral third molar surgery performed under local anesthesia, intranasal DEX appears to provide better postoperative analgesia.
Ryu et al[10] did a comparison study on 240 patients, divided into three groups, group 1 – where local Anesthesia (lignocaine: Adrenaline - 1: 1,00,000) was administered. Group 2 - IV Dexmedetomidine for sedation with local Anesthesia (lignocaine: Adrenaline - 1: 1,00,000).
Group 3 - 1.0 μg/kg Intranasal Dexmedetomidine and local Anesthesia (lignocaine: Adrenaline - 1: 1,00,000). And he found that the group with IV Dexmedetomidine had greater sedation as compared to intranasal dexmedetomidine and that had greater sedation than no sedation.

Bhargavi et al[11] did a study on 25 patients administered intranasal dexmedetomidine using an atomization device, 30 minutes prior to the surgical procedure. The Ramsay sedation score and Observer's assessment of alertness/sedation score were used to assess intranasal sedation, and achieved similar results of sedation.
A system review of five articles by Shaopeng et al found that after the intranasal administration of dexmedetomidine, significant sedation occurred which started at 20 mins and peak of sedation occurred at 40 mins and basal level was achieved at 80 mins. And in 3 out of 4 articles pain on VAS was improved intra-operatively and post-operatively, which shows the significant analgesic property of dexmedetomidine.

CONCLUSION

This study aimed to evaluate the efficiency of Intranasal Dexmedetomidine for conscious sedation in surgical removal of mandibular third molars.The results demonstrate the sedation was achieved after 30mins of drug administration intranasally with a significant p value of 0.368 for vertical impaction, 0.135 for Mesio-angular, 1.000 for Disto-angular and horizontal (Level of significance at $p \leq 0.05$).
All the patients were comfortable throughout the procedure and were stable heamodynamically. The handling of the solution and the Mucosal Atomiser Device was good and non-invasive to the patients.
Based on the above observations in our study we can conclude that intranasal administration of dexmedetomidine is a effective drug in causing arousal sedation without respiratory depression.
Hence the study proves that use of Intranasal Dexmedetomidine for Conscious Sedation in surgical removal of teeth, is effective and a non-invasive alternative to General Anesthesia for anxious patients.
As a smaller sample size was included in this study, results were satisfactory but the study with larger sample size would provide more accurate results. Therefore For future relevance a study with larger study sample is advocated.

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