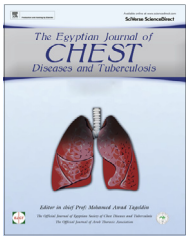
Egyptian Journal of Chest Diseases and Tuberculosis (2013) **62**, 207–214

The Egyptian Society of Chest Diseases and Tuberculosis

Egyptian Journal of Chest Diseases and Tuberculosis

www.elsevier.com/locate/ejcdt
www.sciencedirect.com



ORIGINAL ARTICLE

Do dental procedures affect lung function and arterial oxygen saturation in asthmatic patients?

Magdy Mahmoud Emara [a,g,*], Hussain Abdulallah Yamany [b], Sally Awad [c], Tarek A. Elshazly [d], Ali Shamaa [e,f]

[a] *Department of Thoracic Medicine, Mansoura University, Mansoura 35516, Egypt*
[b] *Department of Internal Medicine (Cardiology), Taibah University, Saudi Arabia*
[c] *Department of Oral Surgery, Mansoura University, Egypt*
[d] *Department of Internal Medicine, Mansoura University, Egypt*
[e] *Department of Oral Biology, Minia University, Egypt*
[f] *Department of Oral Basic Science, Taibah University, Saudi Arabia*
[g] *Department of Internal Medicine (Pulmonology), Taibah University, Al-Madinah Al-Munawara 30001, Saudi Arabia*

Received 10 January 2013; accepted 20 February 2013
Available online 20 March 2013

KEYWORDS

Lung function;
Oxygen saturation;
Asthma;
Dental procedures

Abstract *Background:* Asthma is a chronic inflammatory condition of the airways. Pain and anxiety triggered by dental treatment can induce the secretion of endogenous catecholamines. When the situation is combined with the use of local anesthetics with vasoconstrictors, it may increase its undesirable effects on the cardiovascular system and respiratory systems.

Aim of the work: To evaluate the effects of dental procedures with and without local anesthesia on pulmonary function and arterial oxygen saturation in healthy volunteers and asthmatic patients.

Patients and methods: Our study included 30 asthmatic patients, and 20 healthy volunteers. Careful history taking, clinical examination, spirometry and pulse oximetry to measure O_2 saturation before and 10 min after dental procedures were obtained.

Results: Pulmonary function showed a statistically significant decrease in PEF and O_2 saturation in asthmatic patients and a statistically significant decrease in O_2 saturation in the healthy group after dental procedures compared to pre-procedure results. Asthmatic patients receiving local anesthesia had a statistically significant decrease in PEF and O_2 saturation after dental procedures compared to pre-procedure results. In the healthy group, there was a statistically significant decrease in O_2 saturation after dental filling and dental prosthesis and in asthmatic patients after dental filling, extraction, prosthesis, and scaling compared to that before.

* Corresponding author at: Department of Thoracic Medicine, Mansoura University, Mansoura 35516, Egypt.
E-mail address: magdyemara@live.com (M.M. Emara).

Peer review under responsibility of The Egyptian Society of Chest Diseases and Tuberculosis.

ELSEVIER Production and hosting by Elsevier

 http://dx.doi.org/10.1016/j.ejcdt.2013.02.011

Conclusion: Asthmatic patients may be at a higher risk of developing oxygen desaturation after dental procedures regardless of their type with and without local anesthesia and a decrease in PEF after dental procedures with local anesthesia.

Introduction

Asthma is characterized by chronic airway inflammation and increased airway hyperresponsiveness, leading to symptoms such as wheezing, coughing, chest tightness and dyspnea. It is characterized by the obstruction of airflow which varies over a short period of time and is reversible, either spontaneously or with treatment [1]. It has been demonstrated that there is a reduction of lung function in 15% of asthmatic patients studied while receiving dental care [2]. The critical moments of dental treatment in which an asthma attack can be triggered are immediately after local anesthetic injection and those maneuvers that cause stress – such as extractions, surgery, or dental pulp removal in endodontic procedures [3]. Stress and anxiety can alter the respiratory rate which in time may alter oxygen saturation and or carbon dioxide levels in the blood [4]. Table 1 shows a number of drugs used in dental care and which have specific implications when dealing with asthmatic patients [5].

There are several medical conditions that can cause hypoxia and, thus, should be of concern to the practicing dentist. Diseases such as asthma, chronic obstructive pulmonary disorder (COPD), emphysema, congestive heart failure (CHF), cystic fibrosis and some blood disorders have the potential to cause hypoxia. Dental procedures, which tend to also decrease oxygen supply, should be avoided [7]. The etiology, pathogenesis, and treatment of asthma have not been adequately addressed in the recent dental literature [3]. Dentists and dental hygienists should be sensitive to the health risks of patients in order to take necessary precautions and avoid emergent episodes from occurring during oral health care. Since many dental procedures are stressful, and because oral health care professionals operate in the oral cavity; the origin of the upper airway, patients with chronic respiratory diseases such as asthma are at special risk [8].

The purpose of this study is to evaluate the effects of routine dental procedures with and without local anesthesia on pulmonary function and arterial oxygen saturation in healthy volunteers and asthmatic patients.

Patients and methods

Our study was carried out on 30 asthmatic male patients (their ages ranged from 18 to 59 years) with a mean age (35.73 ± 12.80) years), and 20 healthy male volunteers (their ages ranged from 19 to 51 years with a mean age (35.90 ± 11.11 years) who attended the dental clinics of the College of Dentistry, Taibah University, Al-Madinah Al-Munawarah, Kingdom of Saudi Arabia. Adherence to federal and state regulations concerning the welfare of human subjects was maintained throughout the study. The participants' rights, privacy, health, and well-being were safeguarded through informed consent forms that they were asked to read and sign if they agreed to participate in the study. They were informed about the study by an announcement posted in the waiting room. Study data were collected within 3 months. All asthmatic patients and 20 healthy control groups were subjected to:

1. Thorough history taking, careful clinical examination and Intraoral examination (screening), Panoramic X-ray to determine the patient dental complaint and the dental procedure required for the patient.
2. Spirometry to measure FEV1, FVC, FEV1/FVC, PEF, FEF25-75%, MVV before and 10 min after dental procedures.
3. Pulse oximetry to measure O_2 saturation before and 10 min after dental procedures.

Prior to the dental procedure, each patient was seated in the dental chair and allowed five minutes to adjust to the environment. The finger clip of the pulse oximeter was applied to the right forefinger. Baseline readings for spirometry, and SaO_2 were then taken. The readings were also taken after ten minutes of the end of the dental procedure.

Local dental anesthetics were administered using 1.8 ml of (Scandicaine 2% special) injectable solution (SEPTODONT-58, rue du Pont de Creteil. 94107 Saint-Maur-des-Fosses Cedex, France). Each 1.8 ml cartridge contains Mepivacaine hydrochloride 36 mg, adrenaline 0.018 mg, sodium chloride 11.70 mg, potassium metabisulfite 2.16 mg corresponding to 1.24 mg so_2, sodium edetate 0.45 mg, concentrated hydrochloric acid 0.024 microml, sodium hydroxide solution, water for injection. All asthmatic patients had paroxysmal attacks of wheezy chest, dyspnea, cough and expectoration or documented reversible airway obstruction as determined by a > 12% improvement in FEV1 after bronchodilator administration or Peak expiratory flow rate variability (> 20%).

Table 1 Drugs to be avoided in asthmatic patients.

Drugs containing aspirin (10–28% of all asthmatics may not tolerate the latter) [6].
Nonsteroidal anti-inflammatory drugs (patients with intrinsic asthma).
Macrolide antibiotics in patients treated with theophylline. Serum methylxanthines levels (theophylline) may be increased.
Opiates: these can cause respiratory depression and histamine release.
Local anesthetics: use solutions without adrenalin or levonordefrin, due to sulfite preservative contents.
If the patient is receiving prolonged systemic corticosteroid treatment, supplements may be needed (prior to dental procedures that might cause stress).

Statistical analysis

Analyses, using SPSS version 12 were performed with respect to the main study aim. *T-test* was used to compare normally distributed continuous variables. $P \leqslant 0.05$ was considered statistically significant and $P \leqslant 0.001$ was considered highly statistically significant.

Results

Our study included 30 asthmatic male patients (their ages ranged from 18 to 59 years with a mean age (35.73 ± 12.80) years, and 20 healthy male volunteers (their ages ranged from 19 to 51) years with a mean age (35.90 ± 11.11 years). Six (30%) out of 20 healthy volunteers were subjected to filling and extraction and 4 (20%) were subjected to prosthesis and scaling respectively. On the other hand, 13 (43.33%) out of 30 asthmatic patients were subjected to filling, 8 (26.66%) to extraction, 6 (20%) to prosthesis and 3 (10%) to scaling. Thirteen (65%) out of 20 healthy volunteers and 19 (63.33%) out of 30 asthmatic patients were subjected to local anesthesia before the dental procedure (table 2).

Results of pulmonary function showed a statistically significant decrease in PEF and O_2 saturation measured by pulse oximetry after dental procedures compared to pre-procedure results in asthmatic patients. On the other hand, in the healthy group there was a statistically significant decrease in O_2 saturation after dental procedures compared to pre-procedure results. But, there were no statistically significant differences in other pulmonary function data after dental procedures compared to pre-procedure results in both groups (Table 3).

On comparing the results of pulmonary function and O_2 saturation by pulse oximetry in asthmatic patients, there was

Table 2 Patient characteristics, type of dental procedures and number of patients subjected to local anesthesia in healthy and asthmatic groups.

	Healthy group No. = 20		Asthmatic group No. = 30	
	No.	%	No.	%
Filling	6	30	13	43.33
Extraction	6	30	8	26.66
Prosthesis	4	20	6	20
Scaling	4	20	3	10
With local anesthesia	13	65	19	63.33
Without local anesthesia	7	35	11	36.66
Sex				
Males	20	100	30	100
Females	0	0	0	0
Age (years): M ± SD	35.90 ± 11.11		35.73 ± 12.80	
Maximum age (years)	51		59	
Minimum age (years)	19		18	

Table 3 Pulmonary function data and O_2 saturation by pulse oximetry in healthy and asthmatic groups before and after dental procedures.

Pulmonary function data	Healthy group No. = 20		Asthmatic group No. = 30	
	Before dental procedures M ± SD	After dental procedures M ± SD	Before dental procedures M ± SD	After dental procedures M ± SD
FVC	86.90 ± 10.27	87.60 ± 10.54 $P > .05$	76.53 ± 10.03	76.70 ± 11.24 $P > .05$
FEV1	96.25 ± 11.69	95.85 ± 10.64 $P > .05$	76.16 ± 10.96	76.26 ± 12.44 $P > .05$
PEF	80.20 ± 14.38	76.25 ± 15.58 $P > .05$	78.33 ± 15.68	67.73 ± 16.17 $P < .05$
FEF25%	87.65 ± 19.28	88.30 ± 18.43 $P > .05$	74.66 ± 20.03	76.96 ± 17.71 $P > .05$
FEF50%	107.25 ± 19.23	106.40 ± 16.37 $P > .05$	85.03 ± 18.69	88 ± 21.36 $P > .05$
FEF75%	106.05 ± 13.83	105.60 ± 13.93 $P > .05$	89.06 ± 17.15	92.9o ± 21.15 $P > .05$
MVV	104.70 ± 22.31	105.15 ± 15.37 $P > .05$	85.86 ± 19.43	89.90 ± 18.47 $P > .05$
O_2 saturation by pulse oximetry	97.85 ± 0.98	97 ± 1.37 $P < .05$	97.93 ± 1.11	96.60 ± 1.32 $P < .01$

Table 4 Pulmonary function data and O_2 saturation by pulse oximetry in healthy and asthmatic groups before and after dental procedures with and without local anesthesia.

Pulmonary function data	Healthy group No = 20				Asthmatic group No = 30			
	With local anesthesia No. = 13		Without local anesthesia No. = 7		With local anesthesia No. = 19		Without local anesthesia No. = 11	
	Before dental procedures M ± SD	After dental procedures M ± SD	Before dental procedures M ± SD	After dental procedures M ± SD	Before dental procedures M ± SD	After dental procedures M ± SD	Before dental procedures M ± SD	After dental procedures M ± SD
FVC.	89.84 ± 10.78	90.61 ± 11.22 $P > .05$	81.42 ± 6.92	82 ± 6.60 $P > .05$	76.68 ± 10.71	76.26 ± 11.69 $P > .05$	76.27 ± 9.20	77.45 ± 11.71 $P > .05$
FEV1.	100.07 ± 12.10	99.69 ± 10.46 $P > .05$	89.14 ± 7.01	88.71 ± 6.94 $P > .05$	74.68 ± 9.97	73.57 ± 11.53 $P > .05$	78.72 ± 12.57	81.18 ± 12.46 $P > .05$
PEF.	80.61 ± 16.31	76.30 ± 16.17 $P > .05$	79.42 ± 11.04	76.14 ± 15.67 $P > .05$	77.10 ± 17.85	65.94 ± 16.21 $P < .05$	80.45 ± 11.47	70.81 ± 16.40 $P > .05$
FEF25%	91.61 ± 12.02	89.15 ± 22.20 $P > .05$	80.28 ± 14.00	86.71 ± 9.21 $P > .05$	74 ± 22.73	72.89 ± 19.35 $P > .05$	75.81 ± 15.20	83.27 ± 12.19 $P > .05$
FEF50%	107.15 ± 20.87	102.92 ± 17.80 $P > .05$	107.42 ± 17.33	112.85 ± 11.85 $P > .05$	82.84 ± 17.77	83.47 ± 18.91 $P > .05$	88.81 ± 20.49	95.81 ± 23.94 $P > .05$
FEF75%	102.53 ± 11.22	103.53 ± 13.24 $P > .05$	112.71 ± 16.57	109.42 ± 15.41 $P > .05$	86.21 ± 18.71	90.78 ± 20.01 $P > .05$	94 ± 13.46	96.54 ± 23.52 $P > .05$
MVV	103.92 ± 14.16	106.76 ± 12.74 $P > .05$	106.14 ± 34.23	102.14 ± 20.18 $P > .05$	84.52 ± 19.77	89.78 ± 19.20 $P > .05$	88.18 ± 19.54	90.09 ± 18.06 $P > .05$
O_2 Sat% by pulse oximetry	98 ± 1.00	97.23 ± 1.48 $P > .05$	97.57 ± 0.97	96.71 ± 1.38 $P > .05$	97.68 ± 1.24	96.52 ± 1.38 $P > .01$	98.36 ± 0.67	96.72 ± 1.27 $P < .01$

Table 5 Pulmonary function data and O_2 saturation by pulse oximetry in the healthy group before and after different dental procedures.

Pulmonary function data	Healthy group No = 20							
	Filling No. = 6		Extraction No. = 6		Prosthesis No. = 4		Scaling No. = 4	
	Before dental filling M ± SD	After dental filling M ± SD	Before dental extraction M ± SD	After dental extraction M ± SD	Before dental prosthesis M ± SD	After dental prosthesis M ± SD	Before dental scaling M ± SD	After dental scaling M ± SD
FVC	92.16 ± 5.94	91.83 ± 7.30 $P > .05$	89 ± 14.85	91.50 ± 14.63 $P > .05$	80.75 ± 5.73	80.75 ± 4.27 $P > .05$	82 ± 7.87	82.25 ± 8.50 $P > .05$
FEV1	102.50 ± 5.75	102.16 ± 5.63 $P > .05$	99 ± 17.23	99.16 ± 14.00 $P > .05$	87.50 ± 4.79	84.75 ± 3.94 $P > .05$	91.50 ± 8.18	92.50 ± 6.40 $P > .05$
PEF	78 ± 8.74	77.16 ± 5.41 $P > .05$	83.50 ± 23.13	76.66 ± 24.22 $P > .05$	80.75 ± 15.84	71.50 ± 19.50 $P > .05$	78 ± 7.83	79 ± 9.41 $P > .05$
FEF25%	90.83 ± 19.00	92.16 ± 19.53 $P > .05$	95 ± 25.22	91 ± 24.83 $P > .05$	75.50 ± 16.78	79.50 ± 16.36 $P > .05$	84 ± 8.24	87.25 ± 8.38 $P > .05$
FEF50%	105.33 ± 16.31	103.50 ± 15.21 $P > .05$	109.50 ± 27.68	103.16 ± 22.88 $P > .05$	98.75 ± 8.26	110 ± 15.57 $P > .05$	115.25 ± 18.83	112 ± 10.00 $P > .05$
FEF75%	102.50 ± 5.16	102.16 ± 4.49 $P > .05$	97 ± 9.69	105.33 ± 19.83 $P > .05$	109.50 ± 18.04	107.50 ± 15.24 $P > .05$	113.50 ± 15.50	109.25 ± 16.17 $P > .05$
MVV	99.33 ± 17.45	105.83 ± 16.19 $P > .05$	107.16 ± 11.23	108.66 ± 10.74 $P > .05$	112.50 ± 44.17	99.75 ± 16.04 $P > .05$	101.25 ± 17.85	104.25 ± 23.32 $P > .05$
O_2 Sat% by pulse oximetry	98.33 ± 0.81	97.50 ± 0.54 $P < .05$	97.66 ± 1.21	97 ± 2.00 $P > .05$	98 ± 0.00	96.25 ± 1.25 $P > 0.001$	97.25 ± 1.25	97 ± 1.41 $P > .05$

Table 6 Pulmonary function data and O_2 saturation by pulse oximetry in the asthmatic group before and after different dental procedures.

Pulmonary function data	Asthmatic group No. = 30							
	Filling No. = 13		Extraction No. = 8		Prosthesis No. = 6		Scaling No. = 3	
	Before dental filling M ± SD	After dental filling M ± SD	Before dental extraction M ± SD	After dental extraction M ± SD	Before dental prosthesis M ± SD	After dental prosthesis M ± SD	Before dental scaling M ± SD	After dental scaling M ± SD
FVC	77.38 ± 10.05	77.30 ± 15.22 $P > .05$	79.37 ± 11.75	77.62 ± 8.26 $P > .05$	74.66 ± 9.99	76.33 ± 9.81 $P > .05$	72.33 ± 3.05	72.33 ± 4.04 $P > .05$
FEV1	74.61 ± 13.79	73.84 ± 15.87 $P > .05$	75.12 ± 8.45	76.75 ± 10.08 $P > .05$	78.33 ± 10.38	77.66 ± 10.05 $P > .05$	81.33 ± 2.51	82.66 ± 4.16 $P > .05$
PEF	83.46 ± 15.12	77.92 ± 16.24 $P > .05$	77.50 ± 18.37	65.12 ± 12.04 $P > .05$	70.16 ± 15.41	62.50 ± 22.09 $P > .05$	74.66 ± 4.93	62.66 ± 12.70 $P > .05$
FEF25%	81.61 ± 19.53	80.69 ± 19.45 $P > .05$	71.75 ± 23.12	73 ± 16.51 $P > .05$	65.83 ± 18.44	75 ± 19.29 $P > .05$	70 ± 13.89	76 ± 4.58 $P > .05$
FEF50%	87.92 ± 20.15	87.76 ± 24.21 $P > .05$	85.75 ± 18.61	87.25 ± 18.14 $P > .05$	77.16 ± 20.71	84.66 ± 20.61 $P > .05$	86.33 ± 10.11	98.66 ± 24.66 $P > .05$
FEF75%	91.38 ± 15.40	96.46 ± 20.70 $P > .05$	83.50 ± 19.49	87.37 ± 21.84 $P > .05$	87.83 ± 17.29	91.16 ± 21.32 $P > .05$	96.33 ± 22.89	95.66 ± 29.73 $P > .05$
MVV	87.46 ± 20.35	92.53 ± 19.47 $P > .05$	84.12 ± 18.25	89.75 ± 14.74 $P > .05$	82.33 ± 26.71	90.33 ± 23.77 $P > .05$	80.66 ± 7.02	78 ± 15.62 $P > .05$
O_2 Sat% by pulse oximetry	97.61 ± 1.44	96.38 ± 1.32 $P > .05$	98.25 ± 0.70	96.87 ± 1.64 $P > .05$	98 ± 0.89	96.66 ± 1.36 $P > .05$	98.33 ± 0.57	96.66 ± .0.57 $P < 0.01$

a statistically significant decrease in PEF and O_2 saturation after dental local anesthesia compared to that before and a statistically significant decrease in O_2 saturation after dental procedures without local anesthesia compared to pre-procedure results. But, there were no statistically significant differences in other pulmonary function data in asthmatic patients and in all pulmonary function data in healthy volunteers after dental procedures with and without local anesthesia compared to pre-procedures results (Table 4).

Our results showed a statistically significant decrease in O_2 saturation measured by pulse oximetry after dental filling, and a highly statistically significant decrease in O_2 saturation after dental prosthesis compared to pre-procedure results in the healthy group. But, there were no statistically significant differences in other pulmonary function data after dental filling extraction, prosthesis, and scaling compared to pre-procedures results in healthy volunteers (Table 5).

In asthmatic patients, our results showed a statistically significant decrease in O_2 saturation measured by pulse oximetry after dental filling, extraction, prosthesis, and scaling compared to pre-procedure results. But, there were no statistically significant differences in other pulmonary function data after dental filling extraction, prosthesis, and scaling compared to pre-procedure results in asthmatic patients (Table 6).

Discussion

Asthma is a chronic inflammatory condition of the airways characterized by hyperresponsiveness and episodic reversible symptoms of airflow obstruction [9]. Under most circumstances, it is impossible to provide effective dental care without the use of local anesthetics and vasoconstrictors. Pain and anxiety triggered by dental treatment can induce the secretion of endogenous catecholamines. When the situation is combined with local anesthetics with vasoconstrictors use, it may increase its undesirable effects on the cardiovascular system and respiratory system. Local anesthetic agents containing sulfites may induce bronchospasm in asthmatic patients [10]. Elective treatment should be carried out in asymptomatic or controlled asthmatic patients [3]. Therefore; the purpose of this study was to evaluate the effects of routine dental procedures with and without local anesthesia on pulmonary function and arterial oxygen saturation in healthy volunteers and asthmatic patients. Up to our knowledge, available literatures concerning the changes in pulmonary function and O_2 saturation after dental procedures in asthmatic patients are few.

Results of pulmonary function showed a statistically significant decrease in PEF and O_2 saturation measured by pulse oximetry after dental procedures compared to pre-procedure results in asthmatic patients. On the other hand, there was a statistically significant decrease in O_2 saturation after dental procedures compared to pre-procedure results in the healthy group. On comparing the results of pulmonary function and O_2 saturation by pulse oximetry in asthmatic patients, there were statistically significant decreases in PEF and O_2 saturation after dental local anesthesia compared to pre-procedure results. This is in accordance with Mathew et al. [2] who tested the lung function of 57 patients 6- to 18-year-old with histories of active asthma, using spirometry before, immediately after and 30 min after routine dental treatment. Results revealed a statistically significant decrease ($P < .05$) in the lung function and a clinically significant decrease in the lung function in approximately 15% of the subjects. Also, Lowe and Brook [11] reported that Find all citations by this author (defaultOrfilter your current searchOxygen saturation) recorded in 96 adults undergoing removal of the third molar tooth in dental surgery. Half of the patients received local anesthetic alone; the remainder received, in addition, intravenous midazolam. Patients receiving sedation sustained the greatest falls in oxygen saturation. However, in 10 out of 48 patients undergoing third molar removal with local anesthetic alone, oxygen saturations in the range of 89–93% were recorded. The results of this study suggest that all patients undergoing the removal of third molars are at a risk of hypoxia. Short episodes of hypoxia may be of little consequence in healthy subjects, but in compromised patients early detection may avoid serious complications. Similarly, a clinical trial study conducted by Kaviani et al. [12] reported that the mean value of peripheral finger blood SpO_2 before local anesthetic injection was 98.2% and remained stable during surgery. In the adjacent tooth, the mean values of the pulpal SpO_2, before and after local anesthesia, were 87.73% and 79.27%, respectively; immediately after surgery it was 86.13% and one hour after surgery it was 86.4%. The decrease in the value of pulpal SpO_2 after local anesthesia compared to that before the injection was significant. Our results showed a statistically significant decrease in O_2 saturation measured by pulse oximetry after dental filling, and a highly statistically significant decrease in O_2 saturation after dental prosthesis compared to pre-procedure results in the healthy group. On the other hand, there was a statistically significant decrease in O_2 saturation measured by pulse oximetry after dental filling, extraction, prosthesis, and scaling compared to pre-procedure results in asthmatic patients. Lanigan [13], in a study of oxygen saturation measured by pulse oximetry during recovery from outpatient dental anesthesia in 120 children reported that 18 out of 60 children (30%) given air and 14 of 60 (23%) given oxygen exhibited desaturation ($< 91\%$) and significant desaturation after brief dental anesthesia ($P > 0.05$). On the other hand, Lanre et al. [14] in a study conducted on the effect of restorative dental procedures on vital signs in children reported that there was no significant change in arterial oxygen saturation throughout the operative procedure, some slight desaturation below the preoperative level was recorded. Also, Goodday and Crocker [7] reported that in both groups of healthy patients, there was no significant change in arterial oxygen saturation before and after rubber dam isolation was performed when both proper and improper isolation techniques were used. Although rubber dam placement has no effect on blood oxygen levels in healthy patients, its effects on unhealthy patients are unknown. Padma et al. [15] in a study conducted on the comparative evaluation of oxygen saturation levels using pulse oximeter during surgical and non surgical periodontal therapy in chronic periodontitis patients, reported that there was no statistical difference seen in postoperative and intraoperative values of oxygen saturation. But, a more statistically significant decrease in oxygen saturation levels was observed in non surgical periodontal therapy as compared to surgical periodontal therapy at intraoperative levels. Changes in PEF and oxygen saturation levels in our studied patients may be explained by the bronchoconstrictor effect of sulfite preservative contents of local anesthetics. Changes in heart rate and oxygen saturation levels are affected by pain and other individual factors such as age,

gender, hypertension, previous experience with dental treatment and psychological response [16].

Limitations

There are several limitations to our study. First, the relative small number of patients. Second, the relative small number of dental procedures and the single use of local anesthetic agent.

In conclusion, Asthmatic patients may be at a higher risk of developing oxygen desaturation after dental procedures regardless of their type with and without local anesthesia and a decrease in PEF after dental procedures with local anesthesia. Dental practitioners should be aware of the drugs that should be avoided in asthmatic patients specially local anesthetics with sulfite preservative contents.

Recommendations

The research team recommend another study with more number of asthmatic patients collected from different dental centers for the effect of different dental procedures whether surgical or non surgical with the use of different types of local anesthesia on pulmonary function, O_2 saturation, blood pressure, heart rate, respiratory rate, and ECG changes.

References

[1] M.S. Thomas, A. Parolia, M. Kundabala, M. Vikram, Asthma and oral health: a review, Aust. Dent. J. 55 (2010) 128–133.
[2] T. Mathew, P.S. Casamassimo, S. Wilson, J. Preisch, E. Allen, J.R. Hayes, Effect of dental treatment on the lung function of children with asthma, J. Am. Dent. Assoc. 129 (8) (1998) 1120–1128.
[3] D.M. Steinbacher, M. Glick, The dental patient with asthma. An update and oral health considerations, J. Am. Dent. Assoc. 132 (2001) 1229–1239.
[4] S.D. Aeschliman, M.S. Blue, K.B. Williams, C.M. Cobb, S.R. MacNeill, A preliminary study on oxygen saturation levels of patients during periodontal surgery with and without oral conscious sedation using diazepam, J. Periodontol. 74 (2003) 1056–1059.
[5] K. Laurikainen, P. Kuusisto, Comparison of the oral health status and salivary flow rate of asthmatic patients with those of nonasthmatic adults – results of a pilot study, Allergy 53 (1998) 316–319.
[6] T.P. Sollecito, G. Tino, Asthma, Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod. 92 (2001) 485–490.
[7] R.H.B. Goodday, D.A. Crocker, The effect of rubber dam placement on the arterial oxygen saturation in dental patients, Oper. Dent. 31–2 (2006) 176–179.
[8] M.B. Day, Managing the patient with severe respiratory problems. J Calif Dent Assoc 28 (8) (2000) 585–589, 591–93, 595–598.
[9] US Department of Health and Human Services. NIH practical guide for the diagnosis and management of asthma, 1997 (Publication No.: 97-4053).
[10] R.S. Brown, N.L. Rhodus, Epinephrine and local anesthesia revisited, Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod. 100 (2005) 401–408.
[11] Lowe, Brook, Oxygen saturation during third molar removal with local anesthetic alone and in combination with intravenous sedation, Br. Dent. J. 171 (7) (1991) 210–211.
[12] N. Kaviani, M. Shahaboyi, A. Khabazian, Determining the effect of implant surgery on blood oxygen saturation of the adjacent tooth, Dent. Res. J. 9 (4) (2012).
[13] C.J. Lanigan, Oxygen desaturation after dental anaesthesia, Br. J. Anaesth. 68 (2) (1992) 142–145.
[14] L. Lanre, B.D.S. Bello, S.K. Darwish, Effect of restorative dental procedures on vital signs in children, Saudi Dent. J. 6 (2) (1994).
[15] R. Padma, G. Saakshi, M. Shriniwas, A. Shreedhara, S. Malagi, B. Radhika, B.S. Jagadish Pai, Comparative evaluation of oxygen saturation levels using pulse oximeter during surgical and non surgical periodontal therapy in chronic periodontitis patients, J. Contemp. Dent. Pract. 13 (5) (2012) 661–664.
[16] A. Alemany-Martinez, E. Valmaseda-Castellon, L. Berini-Aytes, C. Gay-Escoda, Haemodynamic changes during the surgical removal of lower third molars, J. Oral Maxillofac. Surg. 66 (3) (2008) 453–461.