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Dental Anxiety, Dental Health Attitudes, and Bodily Symptoms as Correlates of Asthma Symptoms in Adult Dental Patients with Asthma

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Purpose. The purpose of this study was to examine the relationship between asthma symptoms and dental anxiety, dental health attitudes, and physical symptoms and sensations such as watery eyes, upset stomach, headaches, and nausea in a group of adult dental patients with asthma. These variables are believed to be highly related to stress levels, which can exacerbate asthma symptoms during dental treatment.

Methods. Four self-report questionnaires and a demographic information form were completed by 60 adults with asthma in a waiting room of a private dental practice prior to receiving treatment. These instruments assessed dental anxiety, dental health attitudes, bodily symptoms, and asthma symptoms. Bivariate correlations were computed and tested for significance. They were followed by multiple regression analysis to analyze the relationship between the predictor variables-dental anxiety, dental health attitudes, and bodily symptoms, to the dependent variable-asthma symptoms.

Results. Pearson product correlations between the study variables revealed a statistically significant relationship between dental anxiety and bodily symptoms ($r = 0.23$, $p < 0.05$), and asthma symptoms and bodily symptoms ($r = 54$, $p < 0.01$).

The analysis of variance indicated that the overall regression model ($R^2 = 30$) was statistically significant ($F (3, 56) = 7.92$, $p < 0.01$). Bodily symptoms was the only significant variable in the model.

Conclusion. Dentists and dental hygienist should be attuned to adult patients who have asthma and exhibit signs of anxiety and/or other physical symptoms, or indicators of stress that can exacerbate asthma during or prior to dental treatment.

Keywords: Dental anxiety, dental health attitudes, stress, asthma symptoms

Introduction

Undergoing dental treatment may create little anticipatory stress for some people; however, other individuals may inadvertently exacerbate existing chronic health conditions by becoming overly apprehensive prior to their appointments. Numerous theories have been postulated regarding anxiety and fear of dentistry, with a prominent one being previous unfavorable dental experiences.[1] Unfavorable past experiences are likely to affect a patient's dental health attitudes and, ultimately, their body's stress response to dental treatment. Being aware of anticipatory stress may aid the dentist and

dental hygienist in gaining a better understanding of the predisposing conditions that can be responsible for a susceptible patient's somatic response.

A variety of chronic health conditions can become medical risk factors if not properly managed. Not only are medical emergencies dangerous, but, at the very least, they may subsequently interfere with dental treatment.

Respiratory emergencies are among the most common problems encountered during oral healthcare treatment and can be the most devastating.[2] Such problems should be recognized as soon as they occur and treated promptly. Asthma, which has become more prevalent in the last few decades, is a condition in which anxiety can act as a precursor in the body's response to stress. Although the mechanism by which stress worsens asthma is not clear, stressful states have been found to precede asthmatic symptoms.[3] If not managed properly, even mild cases of asthma can be life-threatening; therefore, all health care professionals should be attuned to an asthmatic patient's self-management programs and health status to prevent complications. The purpose of this study was to examine the relationship between asthma symptoms and three predictor variables-dental anxiety, dental health attitudes, and bodily symptoms-in a group of adult dental patients with asthma.

Review of Literature

The etiology, pathogenesis, and treatment of asthma has not been adequately addressed in recent dental literature.[4] 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.[5]

In the last few decades, asthma has become a relatively common condition in both children and adults. The current status of asthma in the United States is paradoxical because, while the mortality rate of most other treatable diseases has declined, asthma fatalities have not.[6] Asthma prevalence, morbidity, and mortality have increased all over the world, and more than 5,000 people die from asthma-related complications annually.[7] In the U.S., asthma affects more than 15 million individuals, most of whom will require and seek dental treatment at some point in life. [7] Interestingly, people with asthma have been noted as having a greater prevalence of tooth decay than their counterparts without asthma.[8] In addition, certain oral conditions, such as reduced salivary flow, increased changes in oral mucosa, increased levels of gingivitis, and oral facial abnormalities, which are associated with asthma, may present oral health challenges in these individuals. [9-13]

Currently, there is no known cure for asthma, but, if addressed properly, it can be managed. The various types of asthma are classified by stimuli that incite asthmatic episodes; however, some classification systems divide the condition into two basic groups-extrinsic and intrinsic asthma.[14] Extrinsic, also known as allergic asthma, is associated with a history of atopy and seasonal allergies, whereas intrinsic asthma is usually associated with specific triggers such as food preservatives, specific medications like aspirin, exercise, cold air, or stress.[15,16]

The link between emotional stress and asthma exacerbation is not clearly understood, but there are several theories regarding the mechanism by which stress affects the disease. One theory regarding allergic asthma and stress postulates that, during a stressful incident, there is a reduction in serum cortisol concentrations, which has anti-inflammatory properties and thus, consequently, triggers asthma.[3] Others have indicated that the psychopathophysiological mechanism that encompasses emotional arousal, such as anxiety in intrinsic asthma, involves the stimulation of the central nervous system through parasympathetic preganglionic efferent fibers to the tracheobronchial tree contained in the vagus nerve. Parasympathetic impulses produce smooth muscle contraction, glandular secretion, and vasodilation, reactions that are all associated with asthma.[17]

The dentist is ethically and legally responsible for any emergency situation that occurs in the dental office. All oral health care professionals should be knowledgeable in the prevention of medical emergencies and prepared to manage any

emergency that might occur while a patient is undergoing care. Even if a patient with asthma is asymptomatic, an asthmatic episode is a medical emergency that is likely to occur in a dental office.[18] Therefore, oral health care professionals need to be aware of each patient's existing health status, medications, and anxiety levels prior to treatment.

Materials and Methods

Design

This research utilized a cross-sectional, pre-experimental design with a convenience sample of 60 adult dental patients with asthma. The dependent variable was asthma symptoms, and the independent variables were dental anxiety, dental health attitudes, and bodily symptoms. These measures were obtained from self-report questionnaires given to adult patients who came in for dental treatment at a private dental practice.

Sample

A convenience sample of 60 male and female adult dental patients between the ages of 18 and 81 [years old] was recruited for this study. All of the patients were previously diagnosed with bronchial asthma by their medical primary care physicians or allergist. All participants were recruited from a private family dental practice located near the University of Texas at Austin (UT). 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. Participants completed the surveys in the waiting room and were offered a fee discount for participating. Study data were collected within a twelve-month period.

Demographic Information Form

The demographic information form that accompanied the questionnaire consisted of seven questions related to the characteristics of the participants. The questions asked the participants' gender, age, marital status, and occupation, which included six categories ranging from unemployed to professional. Labor jobs were defined as on-the-job training jobs and included such jobs as construction work, dental assisting, or custodial work. Semi-skilled jobs were defined as jobs that required a specialty or trade school education, such as cosmetology or acting. Skilled jobs required a two- to four-year college degree. These included banking (loan officers) or computer programming. Professional jobs were defined as requiring a graduate or doctorate degree. College professors, medical doctors, dentists, lawyers, and engineers fell in this category. Occupational categories were derived from a local school district guide. Other demographic characteristics that were assessed included ethnic background, yearly income, and education levels.

Dental Anxiety Scale

The Dental Anxiety Scale (DAS), one of the most widely used instruments for measuring dental anxiety, was used for this study. The DAS is a short, pencil and paper instrument that contains four multiple-choice items dealing with a patient's subjective reactions about going to the dentist, waiting in the dentist's office for the procedure, and anticipation of drilling and scaling.[19] Although other dental anxiety/fear scales were reviewed for this study, the DAS was the most feasible one for this research.[20,21] Each question on the DAS had five alternative responses ranging in value from 1 to 5, with 1 representing the calmest choice and 5 the most anxious. The DAS scores could range from 4 to 20. A score of 4 is indicative of a dental patient who is calm, a dental patient with a score of 9 is considered moderately anxious, and a score of 13 or higher is reflective of a highly anxious dental patient. Previously reported psychometric properties support the validity and reliability of this scale with the internal consistency reliability estimated to be 0.86. [19]

Dental Health Attitude Scale

The Dental Health Attitude Scale (DHAS), a pencil and paper questionnaire, that consisted of 20 Likert-type statements and utilized a five-category rating scale for favorable and unfavorable statements that ranged from strongly agree to strongly disagree was used. The choices offered included: (1) strongly agree, (2) mildly agree, (3) undecided, (4) mildly disagree, and (5) strongly disagree. The favorable statements were scored: (1) strongly agree-5 points, (2) mildly agree-4 points, (3) undecided-3 points, (4) mildly disagree-2 points, and (5) strongly disagree- 1 point. The unfavorable statements were scored: (1) strongly agree-1 point, (2) mildly agree-2 points, (3) undecided-3 points, (4) mildly disagree-4 points, and (5) strongly disagree-5 points. The DHAS included 10 favorable and 10 unfavorable statements. These statements were designed to obtain the patients' personal concepts about oral health. The DHAS scores were determined by summing all item values with a score of 100 representing the highest, 63 representing an average or medium score, and 24 representing the lowest. This scale, which has been used to assess dental health attitudes in other studies, possesses content validity that was established through a panel of judges.[22] Previous research studies have reported the reliability coefficient to range from 70 to 78.[22 23]

Pennnebaker Inventory of Limbic Languidness

Pennebaker Inventory of Limbic Languidness (PILL) was a 54-item symptom inventory used to assess adults. This scale rated common symptoms or bodily sensations that most adults experience at one time or another. Construct validity studies have indicated that individuals who score high in comparison to others on this scale engage in more health-related behaviors, use aspirin more often, and show more autonomic changes in the laboratory setting.[24,25] This scale tapped the frequency of occurrence of a large number of common physical symptoms and sensations ranging from watery eyes, to heartburn, abdominal pain, and sore throat. It was scaled along five points (from (a) 1 = have never experienced the symptom to (e) 5 = more than once every week.) This scale was scored by summing items 1-54, totaling the number of points for items C, D, or E (every month or so or more frequently). The total score, on the 54 items, could range from a low score of 0 to a maximum of 54. A score of 27 would be considered a moderate score. Internal consistency of the PILL has ranged from 0.88 (Cronbach's alpha) to 0.91.[24]

Asthma Symptom Scale

The Asthma Symptom Scale is a scale developed to assess the incidence of respiratory symptoms in individuals with asthma.[25] Lung function measures were not feasible in this study, so this scale was chosen over others. It is specific and brief and possesses sound psychometric properties.[25] Participants were asked if they had experienced any asthma symptoms in the past seven days due to the possibility of anxiety exacerbating asthma or resulting from it.[16] The symptoms examined in this scale included "coughing," "wheezing," "shortness of breath," "increased sputum," "thick sputum," "green or yellow sputum," and "decreased exercise tolerance." Participants who answered "yes" to questions were asked to describe the symptom as slight, moderate, or severe. Participants were also asked about the incidence of symptoms in the previous 24 hours. Scores of 0 were assigned to participants who did not experience symptoms, 2 to those experienced "moderate" symptoms, and 3 to those who experienced "severe" symptoms. An overall score was computed by summing the scores for each time period for the individual symptoms. Scores on this scale could range from a low of 0 to a high of 42. A score of 21 was indicative of someone with moderate asthma symptoms. Previously reported psychometric properties support the validity and reliability of this scale, with the internal consistency reliability estimated to be 0.85 and 0.84, respectively.[25]

Data Analysis

Data analysis procedures included descriptive and multivariate statistical techniques. Descriptive statistics on all demographic variables were performed. Multivariate statistical techniques were utilized to assess the relationships between continuous variables. Multiple linear regression was used to study the relationship between asthma symptoms, treated as the dependent variable, and continuous data, the independent variables from the DAS, the DHAS, and PILL. Data were analyzed by using Statistical Package for Social Sciences (SPSS). A 0.05 significance level was set for this research.

Results

Analysis of the samples' demographic variables revealed that there were more females (*n* = 40, 67%) than males (*n* = 20, 33%) in the study. Fifty (83%) of the participants were Caucasian, three (5%) were African American, three (5%) were Hispanic, three were (5%) Asian American and one (2%) was of unspecified ethnic origin. Twenty-seven (45%) of the participants were married, 29 (48%) were single and never married, two (3%) were single and divorced, and one (2%) was single and widowed. Seventeen (28%) of the participants made less than $20,000 a year, nine (15%) made $20,000 to $30,000 a year, nine (15%) made $30,000 to $40,000 a year, and 23 (38%) made more than $50,000 a year. Seventeen (28%) of the participants had a grammar school education, nine (15%) had a high school education, nine (15%) had completed four years of college, and 23 (38%) had completed graduate school. The greatest number of participants were 23 years old (13%, *n* = 8), with ages ranging from 18 to 81 years. Thirty-three percent (*n* = 20) of the participants were not employed, 7% (*n* = 4) had on-the-job training occupations, and 18% (*n* = 11) were in semi-skilled occupations. Eight participants (13%) were skilled professionals, eight (13%) were semi-professionals, and eight (13%) were professionals. Table I presents the frequency distribution of participants according to sex, ethnicity, marital status, yearly income, education level, age, and occupation.

Table I: Frequency Distribution of Participants According to Gender, Ethnicity, Marital Status, Income, and Education Level (*N* = 58-60)

	N	%
Gender		
Female	40	67
Male	20	33
Ethnicity		
Caucasian	50	83
African-American	3	5
Hispanic	3	5
Asian-American	3	5
Other	1	2
Marital Status		
Married	27	45
Single, Never Married	29	48
Single, Divorced	2	3
Single, Widowed	1	2
Income*		
Under 20,000	17	28
20,000-30,000	9	15
30,000-40,000	9	15
Over 50,000	23	38
Education*		
Grammar School	17	28
High School	9	15
College	9	15
Graduate School	23	38
Age (Years)		
18	1	1.7
19	1	1.7
20	2	3.3
21	5	8.3
22	3	5.0
23	8	13.3
24	4	6.7
25	3	5.0
26	1	1.7
27	3	5.0
28	2	3.3
29	1	1.7
30	1	1.7
31	3	5.0
32	2	3.3
33	3	5.0
37	1	1.7
39	1	1.7
40	2	3.3
42	1	1.7
44	1	1.7
46	1	1.7
47	1	1.7
50	1	1.7
53	1	1.7
55	1	1.7
57	1	1.7
58	1	1.7
60	1	1.7
70	1	1.7
71	1	1.7
81	1	1.7
Occupation**		
Unemployed	20	33.3
On-the-job-training	4	6.7
Semi-skilled	11	18.3
Skilled	8	13.3
Semi-professional	8	13.3
Professional	8	13.3

*Two subjects did not answer this question
**One subject did not answer this question

Variables' Group Mean Scores

Analysis of the groups' overall independent variables revealed mean scores ranging from 8 to 86. The group's dental anxiety scores ranged from 4 to 17 (*SD* = 3.23); dental health attitude scores ranged from 58 to 100 (*SD* = 8.52); and scores on

the PILL ranged from 0 to 44 (*SD* = 9.87). Asthma symptom scores ranged from 0 to 34 (*SD* = 8.02). Table II reveals the variables' group mean scores.

Table II Group Mean Scores for Variables (*N* = 60)

Variable	Mean	Std Dev	Minimum	Maximum	*n*
ASYMPTOM	7.95	8.02	.00	34.00	60
DAS	8.25	3.23	4.00	17.00	60
PILL	15.53	9.87	.00	44.00	60
DHAS	85.72	8.52	58.00	100.00	60

Note. ASYMPTOM = Asthma Symptoms; DAS = Dental Anxiety; PILL = Bodily Symptoms; DHAS = Dental Health Attitudes.

Inferential Statistics

The Pearson product correlations between the study variables revealed a statistically significant relationship between dental anxiety and bodily symptoms ($r = 0.23$, $p < 0.05$) and asthma symptoms and bodily symptoms ($r = 0.54$, $p < 0.01$). Table III depicts the Pearson correlations between the study variables.

Table III Pearson Correlations Between Study Variables (*N* = 60)

	DAS	ASYMPTOM	DHAS	PILL
DAS	1.00			
ASYMPTOM	0.06	1.00		
DHAS	-0.05	-0.05	1.00	
PILL	0.23**	0.54***	0.01	1.00

Note. DAS = Dental Anxiety; ASYMPTOM = Asthma Symptoms; DHAS = Dental Health Attitudes; PILL = Bodily Symptoms.
$^{**}p < 0.05$ $^{***}p < 0.01$, one-tailed tests

A multiple regression analysis was conducted to evaluate the effects of dental anxiety, dental health attitudes, and bodily symptoms on asthma symptoms. Dental anxiety was correlated with bodily symptoms ($r = 0.23$, $p = < 0.05$) and asthma symptoms was moderately correlated with bodily symptoms ($r = 0.54$, $p < 0.01$). None of the other variables were correlated with each other.

The low correlations between the four variables indicated that multicollinearity was not a problem among the predictor variables. To further ensure the stability of the prediction equation and to diagnose multicollinearity among the variables, the variance inflation factors for the predictors were examined. All factors were under 10; therefore, strong linear relationships among the predictors were not of concern.

The analysis of variance indicated that the overall regression model ($R^2 = 0.30$) was statistically significant (F (3, 56) = 7.92), $p < 0.01$). Bodily symptoms was the only significant variable in the model. Table IV presents the summary multiple regression statistics for the variables in the equation.

Table IV Variables in Multiple Regression Equation

Variable	B	SE B	Beta	T	VIF	T	Sig T
DAS	-0.18	0.29	-0.07	0.94	1.06	-0.635	0.53
DHAS	-0.06	0.11	-0.06	1.00	1.00	-0.55	0.58
PILL	0.45	0.09	0.56	0.94	1.05	4.82	0.00
(Constant)	7.41	9.53				0.78	0.44

Note. DAS = Dental Anxiety; DHAS = Dental Health Attitudes; PILL = Bodily Symptoms.

Discussion

Because this study was conducted in a dental practice located close to a major university, it was not unlikely that 23 year olds comprised 13% (n = 8) of the group and that there were more 23 year olds in the study than any other age. The fact that almost 30% (n = 29) of the participants were single and had never been married, and that at least 20 (n = 33%) of the participants reported being unemployed, was probably, reflective of the fact that many of the participants were full-time college students.

The group's dental anxiety scores ranged from 4 to 17 (M = 8.25, SD = 3.23). Normative data suggests that private dental practice patients have the lowest mean values (M = 6.40, SD = 2.80), college students have moderate values (M = 9.33, SD 3.17), and dental phobics have the highest values (M = 17.18, SD = 1.80).[19] Any score over 13 on the DAS is considered to indicate a highly anxious person. Only three participants (5%) scored low on the DAS, 50 (83%) had medium scores, and seven (12%) of the participants reported high DAS scores prior to their dental appointments. Nearly one-half (n = 48) scored under 13. Females had higher DAS scores, with a group mean score of 8.7 (SD = 3.4), and males had a group mean score of 7.3 (SD = 2.3). These findings replicate other studies that have found females to have higher dental anxiety scores than males.[26-28] Some researchers attribute this gender-related finding to the belief that females experience emotions of greater intensity than men.[29-31]

Dental Health Attitude Scale scores ranged from 58 to 100, with a group score mean of 86 (SD = 8.5). Only one participant (2%) scored below average on the DHAS. Fifty-seven (95%) of the participants in the study group scored above 69, which is considered above average, Two (3%) of the participants scored 100, which is considered a high score on the DHAS. Others have found group score means of 85.73 (SD = 10.30) in rural adult dental patients and group mean scores of 96.61 (SD = 7.33) in adult suburban dental patients, in addition to significant findings between education levels and dental health knowledge in these groups.[22]

Bodily symptoms scores on the PILL ranged from 0 to 44, with a group mean score of 15.53 (SD = 9.87). Over one-half (65%, n = 39) of the participants reported a lower number of health-related behaviors, 12 participants (20%) had medium scores, and nine participants (15%) scored high on bodily symptoms on the PILL. There was a statistically significant relation between dental anxiety and bodily symptoms (r = .23, $p < 0.05$). Three questions on this scale were closely related to asthma symptoms. They inquired about asthma and wheezing, coughing, and troubled breathing. More than one-half of the participants (n = 34, 57%) reported having asthma and wheezing, 52% (n = 31) reported coughing, and 60% (n = 36) reported having trouble breathing every month or so, or more frequently. Subsequently, Pennebaker noted that anxiety may be a major constituent of the underlying persona of a typical symptom reporter. [24]

Asthma symptoms scores ranged from 0 to 34, with a group mean score of 8. Forty-eight participants (80%) exhibited low asthma symptoms. Twelve (20%) reported medium scores, and only one (0.01%) had a high score on the Asthma Symptom Scale.

Results of the correlational and analysis of variance indicated that the overall multiple regression model ($R^2 = 30$) was statistically significant (F (3, 56) = 7.92), $p < 0.01$). However, the correlation between dental anxiety and bodily symptoms ($r = 23$, $p < 0.05$) indicated that some physical symptoms do accompany dental anxiety, in spite of the small number (n = 7, 12%) of participants who reported high dental anxiety scores. On the contrary, others have found anxiety not to be related to bodily symptoms.[32] Because the dental anxiety levels in this group were within a normal range, it is possible that anxiety in these individuals did not reach the threshold to affect their asthma. Bodily symptoms was the only significant predictor of asthma symptoms ($r = 54$, $p < 0.01$). In light of the fact that asthma symptoms are related to bodily symptoms, oral health care professionals should become attuned to bodily signs and sensations exhibited by an asthmatic patient, as such signs could be critical factors in assessing impending asthma episodes. In this study, it is possible that bodily symptoms was a mediator between dental anxiety and asthma symptoms.

Despite the expectations that dental anxiety and dental health attitudes might be significantly correlated to asthma symptoms, this study's findings did not reveal such relationships between the aforementioned predictor variables and asthma symptoms. Some explanations may account for the study's findings. The patient population in this study may not have needed much current or past dental treatment, which could have influenced the outcome. In addition to small sample size, other limitations also should be acknowledged when generalizing findings of this group of participants to other groups, as many of the participants were single, Caucasian, female, and had attended graduate school. In addition, all findings were based on self-reported data, which increased the potential for respondent bias. Future studies should assess the same variables with larger and more diverse samples. Similar measures as the ones in this study should also be assessed and broken down into high, medium, and low asthma symptom scores and correlated with dental anxiety and dental health attitude scores in order to determine any possible trends that could support future studies. Future studies also should consider assessing asthma severity and frequency of asthma symptoms in order to better prepare oral health care professionals to treat patients with asthma. Because of the growing national prevalence of bronchial asthma and because dentists and dental hygienists are in an ideal position to inform asthmatic patients about their oral health status, more studies regarding oral health, caries prevalence, and asthma medication side-effects that affect the oral cavity should be conducted. [6,7]

Conclusion

It is not uncommon to experience some level of anxiety when seeking dental treatment. Consequently, the bivariate correlations indicated a slight statistically significant relationship between dental anxiety and bodily symptoms ($r = 0.23$, $p < 0.05$). Not only does dental anxiety interfere with regular dental exams by possibly increasing the number of restorative procedures that go undetected and posing management problems for the oral health care staff, it also may activate underlying physiological activity and trigger certain bodily symptoms, which can interfere with treatment. Oral health care professionals should take the necessary steps to ameliorate stress levels in anxious patients, especially those with asthma. Being more tactful and empathetic with the patient and thoroughly explaining each procedure using the appropriate terminology could help put the patient more at ease.

Because bodily symptoms were moderately correlated with asthma symptoms ($r = 54$, $p < 0.01$), it is possible that participants who were experiencing certain bodily symptoms were more attuned to asthma symptoms prior to their dental appointments. Pennebaker noted that high symptom reporters tend to have a more prevalent trait of public self-consciousness.[24] However, because asthma can become a life-threatening condition in a matter of minutes if not properly managed, it should not be taken lightly if a patient with asthma reports respiratory problems. Subsequently, bodily symptoms was the only significant predictor of asthma symptoms in the multiple regression model ($r = 0.54$, $p < 0.01$), with the analysis of variance results indicating that the overall model ($R^2 = 30$) was statistically significant (F (3, 56) = 7.92), $p < 0.01$). In light of this, this study highlights the importance of understanding asthma's role in the manifestation of various bodily symptoms that asthmatic patients can exhibit prior to dental treatment. Because more than one-half of the participants reported frequent coughing, wheezing, or difficulty breathing several days prior to their dental appointments, using short-acting asthma inhalers before and/or during oral health care appointments should be recommended in order to alleviate asthma symptoms.

Every dental office should be equipped with medical emergency kits containing medications such as epinephrine and albuterol. The dentist and the dental hygienist should always take sufficient time to evaluate the patient's health history,

medications being taken, and any previous asthma emergencies. Any medical risk factors involved should be determined, including determining if the patient is emotionally stable to undergo treatment. Certain vital signs that are closely related to asthma symptom onset, such as a rapid respiratory rate (20-45 breaths per minute), tachycardia (100-150 beats per minute), or a fall in the systolic blood pressure (greater than 15 mm/Hg), should be monitored and mitigated whenever possible.[33] If extreme anxiety, which has been noted as being the most common psychological cause of asthma, is a factor, premedicating the patient should be considered.[34] If the patient has moderate to persistent or severe to persistent asthma, general anesthetic should not be administered due to possible decreased lung function. In this case, a hospital setting is the most feasible place to provide treatment that requires general anesthesia.[35]

Allergens are another potential source of asthma triggers. Latex gloves may pose threats to lung function in asthmatic patients; therefore, inquiries should always be made about possible allergies to latex so that non-latex gloves may be substituted. Another postulated theory that has been considered in decreased lung function in asthmatic dental patients is the colonization of numerous species of bacteria in dental equipment waterlines.

In-depth discussion regarding the various methods to address this issue is beyond the scope of this article, but the possibility of underlying waterline contamination should be recognized, investigated, and eliminated if present.

This study found that bodily symptoms were predictors of asthma symptoms in adult patients prior to dental treatment. These results suggest heightened awareness among dentists and dental hygienists when treating asthmatic dental patients, as there are a variety of extrinsic and intrinsic factors that can trigger an asthma emergency. Because asthma is such a multifocal disease that may be triggered by various physical and/or psychological elements, oral health care professionals should be able to effectively identify patients who are at risk of having an asthma episode in the dental office. Some general principles in the prevention and management of asthma emergencies should be applied, especially when treating patients with tenuous health conditions which can be fatal if not evaluated and managed properly.

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Notes

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References

1. Ning L, Ladelle A. What dental phobics say about their dental experiences. J Can Dent Assoc 1991;56:863-866.
2. Shafer DM. Respiratory emergencies in the dental office. Dent Clin North Am 1995;39:541-545.
3. Ritz T Steptoe A DeWilde S Costa M Emotions and stress increase respiratory resistance in asthma. Psychoso Med 200;62:410-412.
4. Steinbacher DM, Glick M. The dental patient with asthma. JAMA 2001;132:1229-1338.
5. Day MB. Managing the patient with severe respiratory problems. J Calif Dent Assoc 2000;28:585-598.
6. Centers for Disease Control and Prevention CDC surveillance summaries for asthma-United States 1960-1995. MMWR CDC Surveillance Summary 1998;47:1-27.
7. Johns Hopkins School of Public Health Attack asthma: Why America needs a public health defense system to battle environmental threats. The Pew Environmental Health Commission Baltimore 2000;47:1-27.
8. Arnrup K, Lundin SA, Dahllof G. Analysis of paediatric dental services provided at a regional hospital in Sweeden: dental treatment need in medically compromised children referred for dental consultation. Sweed Dent J 1993;17:255-259.
9. Laurikainen K, Kuusisto P. Comparison of the oral health status and salivary flow rate of asthmatic patients with those of nonasthamatic adults: results of a pilot study. Allergy 1998;53:316-319.
10. Lenander-Lumikari M, Laurikainen K, Kuusisto P, Vilji P. Stimulated salivary flow rate and composition in asthmatic and nonasthmatic adults. Arch Oral Biol 1998;43:151-156.

11. Kankaai TM, Virtanen JI, Larmas MA. Timing of the first fillings in the primary dentition and permanent first molars of asthmatic children. Acta Odonolt Scand 1998;56:20-24.
12. McDerra EJ, Pollard MA, Curzon ME. The dental status of asthmatic British school children. Pediatr Dent 1998;20:281-287.
13. McNab S, Battitutta D, Taverne D, Symons SL. External apical root resorption of posterior teeth in asthmatics after orthodontic treatment. J of Amer Ortho Dento Ortho 1999;116:545-551.
14. Sollecito TP, Gregory T. Asthma. Oral Surg Oral Med Oral Path Oral Radiol and Endod 2001;92:485-490.
15. Little JW, Palace DA, Miller CS, Rhodus NL. Pulmonary disease in dental management of the medically compromised patient 5th ed. St. Louis, MO. CV Mosby 1997 245- 251.
16. Lehrer PM, Isenberg S, Hochron SM. Asthma and emotion: A review. J Asthma 1993;30:5-20.
17. Nunn P. Medical emergencies in the oral health care setting. J Dent Hyg 2000;74:136-154.
18. Weinstein AG, Chenkin C, Faust D. Caring for the severely asthmatic child and family. I. The rationale for family systems integrated medical/psychological treatment. J Asthma 1997;34:345-352.
19. Corah NL, Gale EG, Ilig SJ. Assessment of a dental anxiety scale. J Am Dent Assoc 1978;97:816-818.
20. Newton JT, Buck DJ. Anxiety and pain measures in dentistry: a guide to their quality and application. J Am Dent Assoc 2000;10:1449-1457.
21. Schuurs AH. Appraisal of dental anxiety and fear questionnaires: a review. Community Dent Oral Epidemiol 1993;16:329-339.
22. Weaver S. A study to determine the effectiveness of dental health education in affecting adolescents attitudes and knowledge toward dental health 1982 . Unpublished master's thesis. Texas Woman's University, Denton, Texas
23. Russell LM. Dental health attitudes and knowledge levels of rural and suburban. TX J Rur Health 1999;2:18-23.
24. Pennebaker JW. Stimulus characteristics influencing stimulation of heart rate. Psychophysiology 1981;18:540-548.
25. Pennebaker JW. The Psychology of Physical Symptoms. New York. Springer-Verlag 1982.
26. Richards JM, Bailey WC, Windsor RA, Martin B, Soong SJ. Some simple scales for use in asthma research. J Asthma 1988;25:363-371.
27. Wilson TG. Compliance: A review of the literature with possible applications to periodontics. J Periodontol 1978;58:706-714.
28. Kleinknecht R, Klepac RA, Alexander LD. Origins and characteristics of fear of dentist. J Am Dent Assoc 1973;86:842-848.
29. Liddell A, Ackerman C, Locker D. What dental phobics say about their dental experiences. J Can Dent Assoc 1990;56:863-866.
30. Grossman M, Wood W. Sex differences in intensity of emotional experience: a social role interpretation. J Per Soc Psychol 1993;65:1010-1022.
31. Doerr PA, Lang WP, Nyquist LV, Ronis DL. Factors associated with dental anxiety. J of the Amer Dent Assoc 1998;10:1111-1119.
32. Fritz GK, McQuaid EL, Spirito A, Klein RB. Symptom perception in pediatric asthma: Relationship, functional morbidity, and psychological factors. J Am Acad Child Adolesc Psychol 1996;35:1033-1044.
33. Coke JA, Karaki DT. The dental patient and asthma. Gen Dent 2002:504-507.
34. Creer T. Allergy: Principles and Practice. In:Allergy: Principles and Practice St. Louis, MO. Mosby 1978.
35. Glemmon HP, Fafoglia BA. Surgery, anesthesia, and asthma. All about asthma and how to live with it. New York. Sterling Publishing; 1998.
36. Williams JF, Johnston AM, Johnson B, Huntington MK, Mackenkie CD. Microbial contamination of dental unit waterlines: prevalence, intensity, and microbiological characteristics. J Am Dent Assoc 1993;124:59-65.