OPEN ACCESS

ORIGINAL RESEARCH

Relationship between Dyspnea Descriptors and Underlying Causes of the Symptom; a Cross-sectional Study

Seyyed Mohammad Ali Sajadi[1], Alireza Majidi[2], Fahimeh Abdollahimajd[3]*, Fatemeh jalali[1]

1. Department of Internal Medicine, Ali-Ebne-Abitaleb Hospital, Rafsanjan University of Medical Sciences, Rafsanjan, Iran.

2. Department of Emergency Medicine, Shohadaye Tajrish Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

3. Skin Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Abstract: **Introduction:** History taking and physical examination help clinicians identify the patient's problem and effectively treat it. This study aimed to evaluate the descriptors of dyspnea in patients presenting to emergency department (ED) with asthma, congestive heart failure (CHF), and chronic obstructive pulmonary disease (COPD). **Methods:** This cross-sectional study was conducted on all patients presenting to ED with chief complaint of dyspnea, during 2 years. The patients were asked to describe their dyspnea by choosing three items from the valid and reliable questionnaire or articulating their sensation. The relationship between dyspnea descriptors and underlying cause of symptom was evaluated using SPSS version 16. **Results:** 312 patients with the mean age of 60.96±17.01 years were evaluated (53.2% male). Most of the patients were > 65 years old (48.7%) and had basic level of education (76.9%). "My breath doesn't go out all the way" with 83.1%, "My chest feels tight" with 45.8%, and "I feel that my airway is obstructed" with 40.7%, were the most frequent dyspnea descriptors in asthma patients. "My breathing requires work" with 46.3%, "I feel that I am suffocating" with 31.5%, and "My breath doesn't go out all the way" with 29.6%, were the most frequent dyspnea descriptors in COPD patients. "My breathing is heavy" with 74.4%, "A hunger for more air" with 24.4%, and "I cannot get enough air" with 23.2%, were the most frequent dyspnea descriptors in CHF patients. Except for "My breath does not go in all the way", there was significant correlation between studied dyspnea descriptors and underlying disease (p = 0.001 for all analyses). **Conclusion:** It seems that dyspnea descriptors along with other findings from history and physical examination could be helpful in differentiating the causes of the symptom in patients presenting to ED suffering from dyspnea.

Keywords: Dyspnea; asthma; pulmonary disease, chronic obstructive; heart failure; symptom assessment

© Copyright (2017) Shahid Beheshti University of Medical Sciences

1. Introduction

History taking and physical examination help clinicians detect the patient's problem and effectively treat it. Dyspnea is a subjective perception of difficulty breathing, commonly seen in patients with respiratory and cardiovascular diseases. Healthy subjects may also experience it in intense emotional states and during heavy exercise (1-3).

*Corresponding Author: Fahimeh Abdollahimajd; Skin Research Center, Shohadaye Tajrish Hospital, Tajrish Square, Tehran, Iran. Email: fabdollahimajd@yahoo.com, Tell: 0989132914340, Fax: 098-21-22744393

Dyspnea is a multidimensional expression, which has been investigated extensively in clinical and psychological settings. Usually, it is identified as being unable to take a satisfying deep inspiration; moreover, it is characterized as difficulty breathing, which is described by air hunger and an uneasy awareness of breathing at rest or on exertion (4, 5).

As with pain, different terms used to describe the sensation of dyspnea might indicate the underlying diseases (6). Previous studies have shown that descriptors are not only different among patients with different disorders but also in those with the same disease. For instance, to describe breathlessness, patients with asthma, prefer terms as "My chest feels tight "and "I cannot get enough air in", but patients with interstitial lung disease choose the phrase "My

breathing is rapid" (7-10).

The language used to describe dyspnea may be valuable in identifying the cause of dyspnea and choosing the best treatment modality (10). However, lots of variables such as linguistic and cultural differences can affect the results (6). The present study aimed to evaluate the relationship between different descriptors of dyspnea and underlying cause of the symptom in patients presenting to emergency department (ED) suffering from dyspnea.

2. Methods

2.1. Study design and setting

In this prospective cross-sectional study, all patients presenting to ED of Ali-Ebne-Abitaleb Hospital, Rafsanjan, Iran, with chief complaint of dyspnea, during 2 years, were evaluated regarding the descriptors of dyspnea. The study protocol was approved by Ethical Committee of Rafsanjan University of Medical Sciences. The patients were informed about all aspects of the research protocol and written informed consent was obtained from the patients.

2.2. Participants

All patients aged 18 years and older presenting to ED of the mentioned hospital with chief complaint of dyspnea were enrolled using census sampling. Cases of communication disability (because of hearing problem, old age, illiteracy) and hemodynamic instability were excluded. Subjects were also excluded if an ultimate diagnosis other than congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), or asthma was reached.

2.3. Data gathering

After initial assessment and emergency management, all patients were fully examined and eligible patients were included. A prepared questionnaire containing baseline characteristics and descriptors of dyspnea was used for data gathering. The questionnaire used here has been described in a previously published study (11). The questionnaire was translated into Persian language by the researchers and was evaluated in a pilot study, interviewing 20 patients and 5 emergency physicians, to confirm its validity and reliability (Cronbach's alpha for internal consistency = 0.86). To describe dyspnea, two trained medical students asked patients to choose three items from the list. An open ended question was also included allowing patients to describe their sensation if it was not represented in the questionnaire. The patients were categorized into three groups of CHF, COPD, and asthma based on final diagnosis, which was made based on imaging, spirometry, and other diagnostic tests needed.

Table 1: Baseline characteristics of studied patients

Variable	Number (%)
Age (year)	
18 - 30	16 (5.1)
30 - 45	36 (11.5)
45 -65	108 (34.6)
≥ 65	152 (48.7)
Sex	
Male	166 (53.2)
Female	146 (46.8)
Level of education	
Basic	240 (76.9)
High school	64 (20.5)
University	8 (2.6)
Final diagnosis	
COPD	108 (34.6)
Asthma	118 (37.9)
CHF	86 (27.6)

CHF: congestive heart failure; COPD: chronic obstructive pulmonary disease.

2.4. Statistical Analysis

SPSS software version 16 was used for statistical analysis. Mean ± standard deviation or frequency and percentage were used for reporting the results. Chi square test was used to analyze relationships between different variables. Level of significance was 0.05 with a 95% confidence interval.

3. Results

312 patients with the mean age of 60.96±17.01 years (20 - 88) were evaluated (53.2% male). Table 1 shows the baseline characteristics of studied patients. Most of the patients were > 65 years old (48.7%) and had basic level of education (76.9%). The patients of all three groups (COPD, asthma, CHF) were similar regarding age, sex, and level of education (p > 0.05 for all analyses). "My breath doesn't go out all the way" with 83.1%, "My chest feels tight" with 45.8%, and "I feel that my airway is obstructed" with 40.7%, were the most frequent dyspnea descriptors in asthma patients. "My breathing requires work" with 46.3%, "I feel that I am suffocating" with 31.5%, "My breath doesn't go out all the way" with 29.6%, were the most frequent dyspnea descriptors in COPD patients. "My breathing is heavy" with 74.4%, "A hunger for more air" with 24.4%, and "I cannot get enough air" with 23.2%, were the most frequent dyspnea descriptors in CHF patients. Table 2 and 3 summarize the relation between different dyspnea descriptors with final diagnosis and level of education, respectively. Apart from "My breath does not go in all the way", there was a significant correlation between studied dyspnea descriptors and final diagnosis (p = 0.001 for all analysis).

Table 2: The relationship between different dyspnea descriptors and final diagnosis

Descriptors	Diagnosis n (%)			P
	Asthma	COPD	CHF	
My breathing is shallow	0 (0)	0 (0)	0 (0)	-
I feel an urge to breathe More	0 (0)	22 (20.4)	16 (18.6)	0.001
My chest is constricted	2 (1.7)	24 (22.2)	16 (18.6)	0.001
My breathing requires effort	2 (1.7)	22 (20.4)	6 (7)	0.001
I feel a hunger for more air	4 (3.4)	0 (0)	21 (24.4)	0.001
I feel out of breath	4 (3.4)	4 (3.7)	14 (16.3)	0.001
I cannot get enough air	0 (0)	0 (0)	20 (23.3)	0.001
My breath does not go in all the way	4 (3.4)	2 (1.9)	4 (4.7)	0.540
My chest feels tight	54 (45.8)	2 (1.9)	0 (0)	0.001
My breathing requires work	20 (16.9)	50 (46.3)	2 (2.3)	0.001
I feel that I am suffocating/smothering	40 (33.9)	34 (31.5)	12 (14)	0.004
I feel that I cannot get a deep breath	2 (1.7)	12 (11.1)	0 (0)	0.001
I feel that I am breathing more	0 (0)	2 (1.9)	8 (9.3)	0.001
My breath does not go out all the way	98 (83.1)	32 (29.6)	6 (7)	0.001
My breathing is heavy	4 (3.4)	2 (1.9)	64 (74.4)	0.001
I feel that my airway is obstructed	48 (40.7)	4 (3.7)	2 (2.3)	0.001

CHF: congestive heart failure; COPD: chronic obstructive pulmonary disease.

Table 3: The relationship between different dyspnea descriptors and level of education

Descriptors	Level of education n (%)			P
	Basic	High school	University	
My breathing is shallow	0 (0)	0 (0)	0 (0)	-
I feel an urge to breathe More	34 (14.2)	4 (6.2)	0 (0)	0.129
My chest is constricted	42 (17.5)	0 (0)	0 (0)	0.001
My breathing requires effort	24 (10.0)	6 (9.4)	0 (0.0)	0.639
I feel a hunger for more air	25 (10.4)	0 (0)	0 (0)	0.017
I feel out of breath	16 (6.7)	6 (9.4)	0 (0)	0.552
I cannot get enough air	16 (6.7)	4 (6.2)	0 (0)	0.749
My breath does not go in all the way	8 (3.3)	2 (3.1)	0 (0)	0.870
My chest feels tight	30 (12.5)	22 (34.4)	4 (50.0)	<0.001
My breathing requires work	50 (20.8)	20 (31.2)	2 (25.0)	0.212
I feel that I am suffocating/smothering	66 (27.5)	16 (25.0)	4 (50.0)	0.328
I feel that I cannot get a deep breath	12 (5.0)	2 (3.1)	0 (0)	0.670
I feel that I am breathing more	10 (4.2)	0 (0)	0 (0)	0.212
My breath does not go out all the way	86 (35.8)	42 (65.6)	8 (100.0)	<0.001
My breathing is heavy	66 (27.5)	4 (6.3)	0 (0)	<0.001
I feel that my airway is obstructed	24 (10)	24 (37.5)	6 (75.0)	<0.001

4. Discussion

Based on the findings of the present study, patients prefer to use a variety of terminology to describe their sense of dyspnea. There was a significant relationship between the used terms and underlying cause of dyspnea and level of education. "My breath doesn't go out all the way", "my breathing

requires work" , and "my breathing is heavy", were the most frequent phrases used by asthma, COPD, and CHF patients, respectively, for description of their respiratory problem. The leading aim of understanding a patient's dyspnea language is better diagnosis of underlying diseases and consequently increasing therapeutic efficacy. Different qualities of dyspnea sensation can point to prominent afferent mechanisms underlying clinical dyspnea making differential diagnosis easier and potentially advocate the best symptomatic therapy.

More precise definition of symptoms in patients with shortness of breath has been looked into by researchers in the past. In a study, Williams et al. remarked that when the descriptors were not restricted to a single best word or phrase, individuals' description of feeling breathless could differentiate people with and without a previous diagnosis of COPD (8). Several studies have shown that dyspnea perception among people is related to diverse etiologies including physiological, psychological, and racial causes and etc. (12-15). Some reports have stated that race, sex, educational level and socioeconomic class influence the perception of dyspnea (12-15). Barbaro et al. in a study designated that advanced age, airway inflammation, depression status, and severity of asthma affect perception of dyspnea (16).

The relationship between dyspnea descriptors and cause of symptom was strongly significant in the present study. In the study conducted by Mahler et al, the majority of patients with COPD applied work/effort descriptors such as "my breathing requires effort"; on the other hand, "I feel air hunger" had a lower prevalence in these patients (17). In addition, Chang et al. showed that the patients with asthma preferred "My chest feels tight" and mostly "Work/effort" descriptors were chosen by patients with COPD (18).

In line with our findings, Rutgers et al. showed considerable differences in dyspnea perception between COPD and asthma (19). Caroci et al. noted that stable COPD and CHF patients prefer different terms to describe their breathing distress, however, they showed that they may use some similar terms (20). It seems that dyspnea descriptors along with other findings from history and physical examination could be helpful in differentiating the causes of the symptom in patients presenting to ED suffering from dyspnea.

5. Limitation

The main limitation of our study was its relatively small sample size, also this study was conducted in a local region of Iran and its external validity may be limited. Therefore, the results cannot be generalized to the whole of Iranian population. Hence, further investigations are recommended with larger series to validate the findings.

6. Conclusion

Based on the findings of the present study, patients prefer to use a variety of terminology to describe their sense of dyspnea based on underlying cause of symptom and level of education. It seems that dyspnea descriptors along with other findings from history and physical examination could be helpful in differentiating the causes of the symptom in patients presenting to ED suffering from dyspnea.

7. Appendix

7.1. Acknowledgements

7.2. Author contribution

Seyyed Mohammad Ali Sajadi was the lead author and contributed in study design, data gathering and manuscript preparation. Alireza Majidi was involved in concept development and study design and was involved in manuscript development. Fahimeh Abdollahimajd was involved in data gathering, data analysis, interpretation, and manuscript preparation and revision. Fatemeh jalali was involved in data gathering and interpretation.

7.3. Funding/Support

None.

7.4. Conflict of interest

None.

References

1. Mahler DA, Fierro-Carrion G, Baird JC. Evaluation of dyspnea in the elderly. Clinics in geriatric medicine. 2003;19(1):19-33.
2. O'Donnell DE, Banzett RB, Carrieri-Kohlman V, Casaburi R, Davenport PW, Gandevia SC, et al. Pathophysiology of dyspnea in chronic obstructive pulmonary disease: a roundtable. Proceedings of the American Thoracic Society. 2007;4(2):145-68.
3. Wilcock A, Crosby V, Hughes A, Fielding K, Corcoran R, Tattersfield AE. Descriptors of breathlessness in patients with cancer and other cardiorespiratory diseases. Journal of pain and symptom management. 2002;23(3):182-9.
4. Yoos HL, Kitzman H, McMullen A, Sidora-Arcoleo K, Anson E. The language of breathlessness: do families and

health care providers speak the same language when describing asthma symptoms? Journal of Pediatric Health Care. 2005;19(4):197-205.

5. von Leupoldt A, Balewski S, Petersen S, Taube K, Schubert-Heukeshoven S, Magnussen H, et al. Verbal descriptors of dyspnea in patients with COPD at different intensity levels of dyspnea. CHEST Journal. 2007;132(1):141-7.

6. Teixeira CA, Rodrigues Junior AL, Straccia LC, Vianna EdSO, Silva GAd, Martinez JAB. Dyspnea descriptors developed in Brazil: application in obese patients and in patients with cardiorespiratory diseases. Jornal Brasileiro de Pneumologia. 2011;37(4):446-54.

7. Scano G, Stendardi L, Grazzini M. Understanding dyspnoea by its language. European Respiratory Journal. 2005;25(2):380-5.

8. Williams M, Cafarella P, Olds T, Petkov J, Frith P. The language of breathlessness differentiates between patients with COPD and age-matched adults. CHEST Journal. 2008;134(3):489-96.

9. Yorke J, Moosavi SH, Shuldham C, Jones PW. Quantification of dyspnoea using descriptors: development and initial testing of the Dyspnoea-12. Thorax. 2010;65(1):21-6.

10. Carrieri-Kohlman V, Donesky-Cuenco D, Park SK, Mackin L, Nguyen HQ, Paul SM. Additional evidence for the affective dimension of dyspnea in patients with COPD. Research in nursing & health. 2010;33(1):4-19.

11. Harver A, Schwartzstein RM, Kotses H, Humphries CT, Schmaling KB, Mullin ML. Descriptors of breathlessness in children with persistent asthma. CHEST Journal. 2011;139(4):832-8.

12. Hardie GE, Janson S, Gold WM, Carrieri-Kohlman V, Boushey HA. Ethnic differences: word descriptors used by African-American and white asthma patients during induced bronchoconstriction. CHEST Journal. 2000;117(4):935-43.

13. Trochtenberg DS, BeLue R. Descriptors and perception of dyspnea in African-American asthmatics. Journal of Asthma. 2007;44(10):811-5.

14. Trochtenberg DS, BeLue R, Piphus S, Washington N. Differing reports of asthma symptoms in African Americans and Caucasians. Journal of Asthma. 2008;45(2):165-70.

15. Han J, Zhu Y, Li S, Chen X, Put C, Van de Woestijne KP, et al. Respiratory complaints in Chinese: cultural and diagnostic specificities. CHEST Journal. 2005;127(6):1942-51.

16. Barbaro MPF, Lacedonia D, Palladino GP, Bergantino L, Ruggeri C, Martinelli D, et al. Dyspnea perception in asthma: Role of airways inflammation, age and emotional status. Respiratory medicine. 2011;105(2):195-203.

17. Chang A, Waterman L, Mahler D. Prospective Assessment Of Descriptors Of Dyspnea In Chronic Obstructive Pulmonary Disease. Am J Respir Crit Care Med. 2014;189:A2456.

18. Chang AS, Munson J, Gifford AH, Mahler DA. Prospective Use of Descriptors of Dyspnea to Diagnose Common Respiratory Diseases. CHEST Journal. 2015; 148 (4): 895-902.

19. Rutgers S, Ten Hacken N, Koeter G, Postma D. Borg scores before and after challenge with adenosine 5'-monophosphate and methacholine in subjects with COPD and asthma. European Respiratory Journal. 2000;16(3):486-90.

20. de Souza Caroci A, Lareau SC. Descriptors of dyspnea by patients with chronic obstructive pulmonary disease versus congestive heart failure. Heart & Lung: The Journal of Acute and Critical Care. 2004;33(2):102-10.