

Published: February 28, 2023

Citation: Tavel M., 2023. Hyperventilation Syndrome: Ubiquitous but Seldom Recognized, Medical Research Archives, [online] 11(2). <https://doi.org/10.18103/mra.v11i2.3592>

Copyright: © 2023 European Society of Medicine. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

DOI: <https://doi.org/10.18103/mra.v11i2.3592>

ISSN: 2375-1924

RESEARCH ARTICLE

HYPERVENTILATION SYNDROME: UBIQUITOUS BUT SELDOM RECOGNIZED

Morton Tavel

Clinical Professor Emeritus
Indiana University School of Medicine

tavelmorton@gmail.com

ABSTRACT

Hyperventilation syndrome is far more common than generally believed, and thus usually unrecognized. It often produces misleading complaints that include alterations of consciousness, inexplicable sensory and motor sensations, and it is often masked by coexisting somatic symptoms. Confounding the confusion, patients are often unaware of excessive breathing, and subjective “dizziness” is often the presenting complaint. Obscuring recognition further, symptoms attributed to the panic disorder often overlap with those of hyperventilation. Proper diagnosis of hyperventilation is described through the use of the simple bedside maneuver of forced breathing. This diagnosis must be established before effective management can occur.

KEYWORDS: Hyperventilation Syndrome. Panic Disorder. Non-Cardiac Chest Pain. Dizziness. Syncope Pseudo seizures.

**HYPERVENTILATION SYNDROME:
UBIQUITOUS BUT SELDOM RECOGNIZED**

Hyperventilation syndrome is seldom considered as a diagnostic probability, but nevertheless, it is surprisingly common. By most estimates, this abnormality occurs as the primary or contributing diagnosis in as many as 10% of all general medical patients^{1,2} and up to 25% of all patients complaining primarily of “dizziness” or “fainting.”^{3,4} Consistent with these estimates, in an extended medical practice we had encountered many previously unrecognized examples of this disorder. To gain more insight into the magnitude of this problem, together with a physician associate, we reviewed the out-patient records of a cohort of applicants referred to us for independent determination of long-term disability and found—surprisingly—that hyperventilation played a major role in such ailments in approximately 15% of such subjects, but this diagnosis was rarely considered by the attending physicians. More recently, serving as an independent consultant for adjudicating long-term disability cases, I often encountered instances that featured symptoms strongly suggestive of hyperventilation, but again, the managing clinicians made no mention of this possibility. Failure to recognize this problem leads not only to much chronic suffering by patients but also to large and unnecessary financial costs to an already overburdened medical system.

This point is best illustrated by the following hypothetical—but typical—example: A 42-year-old woman presents with 5-year history of recurrent “dizziness” (described more

specifically as “lightheadedness”) often leading to reduced consciousness, sometimes culminating in fainting. Associated with these episodes are sensations of numbness and tingling in the face, arms, and legs, especially over the left side of the body, chest pain, dryness of the mouth, alternating hot and cold bodily sensations, muscle spasms, and profound general weakness. She is uncertain about her breathing during the spells but, even at rest, notes the frequent sensation of being unable to get a “deep breath” or air “cutting off” midway in her chest. Although these episodes could occur at any time, they would typically occur in the presence of large crowds, in warm church services, and with spells of anxiety.

Because of the altered consciousness combined with bodily sensations of numbness, paresthesias, and weakness, especially when they seemed to involve predominantly one side of the body, a neurologist was sought to consider focal disorders such as transient ischemic attacks (TIAs). The latter’s evaluation failed to disclose any abnormalities. She was then referred to both a cardiologist and pulmonologist because of the subjective sensation of dyspnea and chest discomfort, and, after extensive testing by these latter physicians, no abnormalities were found.

Because of this lack of objective physical abnormalities, she was then advised to consult a psychiatrist, who concluded that her spells were a manifestation of “panic attacks.” According to the criteria for panic attacks listed in the current psychiatric handbook⁵

they include, among others, the following features: "Trembling or shaking, sensations of shortness of breath or being smothered, feeling of choking, chest pain or discomfort, feeling dizzy, unsteady, lightheaded, or faint, chills or hot flashes, and paresthesias (numbness or tingling sensations), chills or hot flashes, and palpitations, and/or accelerated heart rate."

Although these criteria are listed as inherent properties of the panic disorder itself (Figure 1),

this description coincides closely with the typical features of hyperventilation syndrome. Seeing no reason to seek hyperventilation as a cause of any of the symptoms, the psychiatrist proceeded with reassurance and psychotropic drugs directed primarily toward control of anxiety. Despite these measures, the patient continued to have the spells, although only partially diminished in frequency.

FIGURE 1

SUMMARY OF MANIFESTATIONS OF HYPERVENTILATION SYNDROME⁷

BODY SYSTEM	SIGNS AND SYMPTOMS
Cardiovascular	<u>Palpitations/tachycardia</u> , arrhythmias, <u>chest pain</u> , blotchy flushing
Neurological	<u>paraesthesia to extremities or face</u> , <u>dizziness/unsteadiness</u> , syncope, headache, blurred or tunnel vision, impaired concentration and memory
Respiratory	tachypnoea, <u>shortness of breath</u> , tightness in chest/throat, frequent sighing, yawning, <u>feeling of suffocation/choking</u>
Gastrointestinal	globus, dysphagia, epigastric discomfort, excessive air swallowing, dry mouth, belching, flatulence, <u>nausea</u>
Musculoskeletal	muscle pains, <u>tremors</u> , weakness, tetany of hands or feet (e.g. carpedal spasm)
Psychological	tension, anxiety, panic, <u>feelings of unreality or disorientation</u> , <u>fear of dying</u> , <u>fear of losing control or going crazy</u> , hallucinations, phobias
General	fatigue, exhaustion, sleep disturbance, <u>sweating</u> , weakness, <u>chills or heat sensations</u>

PHYSIOLOGIC CONSIDERATIONS OF HYPERVENTILATION^{6,7}

How emotional stress can induce an excessive respiratory response is likely rooted in the evolutionary "flight or fight" reaction, wherein, in anticipation of imminent need for

increased exertion combined with increased adrenergic drive, rapid respiration results. If such exertion is not required, however, inappropriately excessive breathing (hyperventilation) produces hypocapnia, respiratory alkalosis and a complex array of

physiologic changes that include widespread vasoconstriction (including cerebral) with increased neurogenic excitability, and they are likely responsible for most of the signs and symptoms as noted in the hypothetical example above and summarized on Figure 1. The sensation of numbness and tingling is often wide spread, but often centered on the periphery (hands and feet), but may occur mainly limited to one side of the body.⁸ These changes may even produce bronchoconstriction that may result in audible wheezing, augmenting the sensation of dyspnea as well as simulating or intensifying preexisting asthma^{9,10} Thus since hyperventilation can complicate asthma, the clinician should consider both asthma and hyperventilation when encountering features of both conditions.

Although frequently manifest in the form of acute attacks, hyperventilation may occur in a more chronic and insidious form¹¹. Such patients may present with unimpressive symptoms that may include atypical chest pain, fatigue, mild dyspnea, or exercise intolerance. Air hunger is common, hinting of the possible presence of hyperventilation, and some have even suggested that this may be an important causative factor in chronic fatigue syndrome¹²; however, this assumption requires further investigation.

HOW TO DIAGNOSE AND TREAT THIS DISORDER

Although some have suggested for diagnosis complex pulmonary studies such as end-tidal CO₂¹³ their accuracy has been challenged and are unnecessarily cumbersome for practical

use. The many possible symptoms and signs¹⁴ of hyperventilation as listed in Fig 1 provide a comprehensive screening tool that is useful for initial suspicion of this disorder. The presence of any features on this list should trigger further testing, and for this purpose, I favor the provocative breathing maneuver as described below:

The clinician instructs the patient, preferably in the upright position, to breathe as deeply and as rapidly as possible for at least two or three minutes, or at least until some evidence of discomfort appears that includes at least numbness and tingling and/or a sensation of dizziness.

If the subject responds affirmatively when asked if these sensations are similar or identical to any of those accompanying the spells, then the diagnosis is confirmed or strongly suspected. After the patient is provided with a simple explanation of the presence and mechanism of hyperventilation, relief of symptoms is then often observed, and this provides further diagnostic confirmation. Diagnosis can be further supported by directing the subject on how to control and suppress the problem by first reproducing the symptoms through purposeful rapid breathing and then terminating it with breath holding, and these maneuvers can be practiced at home. These measures alone may be sufficient to both firmly diagnose and relieve the entire problem. Relieving symptoms through re-breathing into a paper bag has been suggested but is usually not required⁷. I have noticed, however, that, in cases in which symptoms have been present

for a long time, acceptance and control may be difficult, possibly owing to a deeply ingrained pattern of behavior, or in some cases, possibly to secondary gain from an attentive family or friends. Also, for uncertain reasons, the usual chest pain occurring during the attacks may not be reproduced promptly by the rapid breathing maneuver. A cardiac origin of such pain can usually be excluded by careful history taking and appropriate testing. In such cases, simple reassurance may be all that is required to minimize or eliminate pain and reduce superimposed anxiety. Various commonly coexisting somatic complaints without objective findings must be disregarded when one considers the underlying breathing disturbance,^{15,16} but they may require additional attention and treatment.

The diagnosis of panic disorder offers special therapeutic opportunities: The fear and anxiety that initiate the panic response are often compounded by the unpleasant subjective complaints caused by the breathing disorder itself. This, in turn, further increases the fear and rapidity of ventilation, thus creating, in effect, a vicious cycle. By demonstrating the role played by the aggravating hyperventilation, the clinician can interrupt this feedback cycle sufficiently to ameliorate, or even eliminate, the panic response itself. To accomplish this objective, however, the clinician must first suspect the likely superimposition of the breathing disorder on the panic state.

CONCLUSION

Early recognition of the common hyperventilation syndrome is very important because it can prevent unnecessary testing and referrals to specialist physicians, leading to improved, cost-efficient medical care. Most importantly, however, it offers great understanding and relief to the many sufferers of this distressing syndrome.

Corresponding Author:

Morton Tavel

Clinical Professor Emeritus

Indiana University School of Medicine

Email: tavelmorton@gmail.com

Funding Statement:

None

Acknowledgements:

Not applicable

Conflicts of Interest Statement:

None

Funding Statement:

None

References:

- ¹ Magarian, GJ. Hyperventilation syndromes: infrequently recognized common expressions of anxiety and stress. *Medicine*. 1982; 61: 219–236
- ² Magarian GJ, Middaugh DA, and Linz DH Hyperventilation Syndrome: A Diagnosis Begging for recognition. *West J Med*. 1983;138(5): 733–736.
- ³ Hybels RL. History taking in dizziness -- The most important diagnostic step, *Postgraduate Medicine*, Vol. 75, No. 3, 1984.
- ⁴ Perkin GD, Joseph R. Neurological manifestations of the hyperventilation syndrome, *Journal of the Royal Society of Medicine*, 79: 448-450, 1986.
- ⁵ Diagnostic and Statistical Manual of Mental Disorders 2013; Fifth Edition. Edited by American Psychiatric Association: ISBN: 9788123923796
- ⁶ Gardner WN The Pathophysiology of Hyperventilation Disorders *Chest* 1996;109(2):516-34
- ⁷ Wilson, C. Hyperventilation syndrome: diagnosis and reassurance. *Journal of Paramedic Practice*. 2018; 10 (9). 370-375
- ⁸ Tavel, ME: Hyperventilation syndrome and unilateral somatic symptoms. *JAMA*, 187:301, 1964
- ⁹ Jones M, Harvey A, Marston L, and O'Connell NE Breathing exercises for dysfunctional breathing/hyperventilation syndrome in adults. 2013. *Cochrane Database Syst Rev* 5: CD009041 10.1002/14651858.
- ¹⁰ Ferguson A, and Addington-Caensler E. Dyspnea and bronchospasm from inappropriate post exercise hyperventilation. *Ann Intern Med* 1969; 71:1063-72
- ¹¹ Boulding R, Sacey R, Niven R, and Fowler, SJ *Eur Respir Rev*. 2016; 141:287-294. Dysfunctional breathing: a review of the literature and proposal for classification
- ¹² Rosen SD, King, JC, Wilkinson, JB, et al. Is chronic fatigue syndrome synonymous with effort syndrome *J R Soc Med*_ 1990;83: 761-764
- ¹³ Pizzorno JE, Murray MT, Joiner-Bey H. 2016. *The clinician's handbook of natural medicine*. 3rd ed. St Louis: Elsevier.
- ¹⁴ Porth CM, Litwack K. 2009. Disorders of acid-base balance. In: Porth CM, Matfin G, editors. *Pathophysiology: Concepts of altered health states*. 8th ed. Philadelphia: Lippincott Williams & Wilkins. p. 805-25
- ¹⁵ Tavel, ME. Hyperventilation syndrome-hidig behind pseudonyms. *Chest*. 1990; 97: 1285–1288
- ¹⁶ Tavel ME. Somatic symptom disorders without known physical causes: One disease with many names? *American Journal of Medicine*. 2015; 128: 1054-1058