

## Hyperventilation Syndrome: Commonly Encountered, but Regularly Overlooked

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### 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. Obscuring recognition further, symptoms attributed to the panic disorder are often, in reality, those of hyperventilation. Proper diagnosis of this breathing disorder depends upon a heightened awareness of its various manifestations, which can then lead to effective means of diagnosis and management.

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**Received:** June 19, 2022; **Accepted:** June 25, 2022; **Published:** June 30, 2022

**Keywords:** Hyperventilation Syndrome, Panic Disorder, Non-Cardiac Chest Pain, Dizziness, Syncope Pseudo seizures

### Introduction

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, and up to 25% of all patients complaining primarily of “dizziness” or “fainting” [1-3]. Consistent with these estimates, many years ago, together with a physician associate, I reviewed the out-patient records of a cohort of applicants referred for determination of long-term disability, and found-surprisingly-that hyperventilation played a major role in disability in approximately 15% of such subjects, despite the fact that this diagnosis was rarely considered by the managing physicians. Failure to recognize this problem leads not only to much suffering but also to large and unnecessary financial costs to an already overburdened medical system.

This point is best illustrated by the following hypothetical example: A 42 year-old woman presents with 5 year history of recurrent “dizziness” (described more specifically as “lightheadedness”) often leading to reduced consciousness and 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 felt more prominently on her left side. She is uncertain about her breathing during the spells, but 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 these complaints, she consulted a neurologist, who, after a normal neurological exam and several tests that included an MRI of the brain, electroencephalogram, and Doppler study

of the carotid arteries, she was told that there was no neurological explanation for her symptoms. Because her various symptoms included chest pain, she was then referred to a cardiologist. This latter physician, after a normal physical exam, proceeded with additional tests that included an electrocardiogram, ambulatory electrocardiograph (Holter) monitor, echocardiogram, and treadmill stress test, all of which disclosed normal findings.

Because of this lack of objective physical abnormalities, she was advised to consult with a psychiatrist. She did so, and after interrogation, this latter physician concluded that her spells were a manifestation of “panic attacks,” which according to the criteria listed in the current psychiatric handbook, 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” [4]. Although these criteria are listed as inherent properties of the panic disorder itself, this description also 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 partially diminished in frequency.

### Physiologic Considerations of Hyperventilation

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, excessive and inappropriate 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. These changes may even produce bronchoconstriction that may actually result in audible wheezing, augmenting the sensation of dyspnea as well as simulating or intensifying preexisting asthma [1-6]. 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 form [5]. 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 syndrome; however, this assumption requires further investigation. Patients in this latter category may be especially difficult to manage, possibly requiring such measures as breathing training, antidepressants, and cognitive behavioral therapy [7].

### How this Case is Best Diagnosed and Managed

The primary caregiver, whether physician or assistant, observing the patient's demeanor during history taking, may have noticed cues revealed by her occasional sighs and/or deep breaths together with other possible overt manifestations of anxiety. If her complaints also include any features, alone or in combination, listed in the hyperventilation syndrome noted above, this should trigger consideration of this latter diagnosis. Acknowledging this possibility, the clinician then should instruct 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 [3,8,9]. If he/she 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. Further confirmation can be accomplished by explanation of the dynamics of hyperventilation together with how to control and suppress its appearance by first triggering it by rapid breathing and then terminating it with breath holding, maneuvers that should be practiced at home. Relieving symptoms through re-breathing into a paper bag has been suggested, but is usually not required. The diagnosis is further confirmed if and when subsequent attacks are eliminated by these simple measures [2,3]. 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.

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. In order to accomplish this objective, however, the clinician must first suspect the likely superimposition of the breathing disorder on the panic state.

### Why is this Diagnosis Regularly Overlooked?

First, it must be considered. Various commonly coexisting somatic complaints lacking objective confirmation may divert attention from the underlying breathing disturbance [10,11]. The rapid breathing may be erroneously considered as "shortness of breath" in response to physical disorders of the cardiac or pulmonary systems. When dizziness and altered consciousness are combined with bodily sensations of numbness, paresthesias, and weakness, especially when they seem to involve predominantly one side of the body, neurological evaluation may be sought to consider focal disorders such as transient ischemic attacks (TIAs) [12].

Since the diagnosis of hyperventilation syndrome is not subject to confirmation by the usual laboratory or imaging means, a simple office procedure such as forced breathing runs counter to usual diagnostic methods. Although such a diagnostic maneuver has been challenged by some that require complex pulmonary studies that include end-tidal or arterial PCO<sub>2</sub> levels, the simple breathing maneuver provides the simplest and most direct way to determine whether hyperventilation is producing some or all of the various symptoms. Further, more complex, testing is seldom required, but could be employed, depending upon the results of this initial maneuver.

Lastly, in the case of panic attacks, the presence of dizziness, numbness and somatic complaints, as noted above, should mandate a search for hyperventilation as a major contributor to the panic disorder itself and thus managed by the means as suggested above [3,8,13,14].

### Conclusion

A wide variety of patients manifest features that strongly suggest the presence—or contributory role—of hyperventilation, but this diagnosis is seldom considered. This means that provocative testing is not performed and accurate diagnosis is never established. Caregivers managing large general medical populations would be well advised to consider this diagnosis far more frequently. Various specialty groups would also benefit from such awareness. The results could be very gratifying to both patients and clinicians alike!

### References

1. Jones M, Harvey A, Marston L, O'Connell NE (2013) Breathing exercises for dysfunctional breathing/hyperventilation syndrome in adults. *Cochrane Database Syst Rev* 5: CD009041 10.1002/14651858.
2. Magarian GJ (1982) Hyperventilation syndromes: infrequently recognized common expressions of anxiety and stress. *Medicine* 61: 219-236.
3. Magarian GJ, Middaugh DA, Linz DH (1983) Hyperventilation Syndrome: A Diagnosis Begging for recognition. *West J Med* 138:733-736.
4. Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (2013) Edited by American Psychiatric Association: ISBN: 9788123923796.
5. Gardner WN (1996) The Pathophysiology of Hyperventilation Disorders *Chest* 109: 516-534.
6. Ferguson A, Addington-Caensler E (1969) Dyspnea and bronchospasm from inappropriate post exercise

- hyperventilation. *Ann Intern Med* 71: 1063-1072
7. Rosen SD, King JC, Wilkinson JB (1990) Is chronic fatigue syndrome synonymous with effort syndrome. *J R Soc Med* 83:761-764.
  8. Lum JR (1987) Hyperventilation syndromes in medicine and psychiatry: a review. *Soc. Med* 80: 229-231.
  9. Han JN, Stegen K, Schepers R, O Van den Bergh, K P Van de Woestijne (1998) Subjective Symptoms and Breathing Pattern at Rest and following Hyperventilation in Anxiety and Somatoform Disorders. *Journal of Psychosomatic Research* 45: 519-532.
  10. Tavel ME (1990) Hyperventilation syndrome-hiding behind pseudonyms. *Chest* 97: 1285-1288.
  11. Tavel ME (2015) Somatic symptom disorders without known physical causes: One disease with many names? *American Journal of Medicine* 128: 1054-1058.
  12. Tavel ME (1964) Hyperventilation syndrome and unilateral somatic symptoms. *JAMA* 187: 301-303.
  13. Gardner WN (1996) The Pathophysiology of Hyperventilation Disorders *Chest* 109: 516-534.
  14. Hornsveld HK, Garssen B, Dop MJ, PI van Spiegel, JC de Haes (1996) Double-blind placebo- controlled study of the hyperventilation provocation test and the validity of the hyperventilation syndrome. *Lancet* 348: 154-158.

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