

## The Benefits of Breathing Techniques for Pain

Angela VanNostrand, PT, DPT

---

### How does breathing play a role in physical therapy?

Breathing techniques are valued and utilized in physical therapy for several conditions. The diaphragm plays a key role in treatment and its functions can be described as follows:

“The respiratory diaphragm is the most important muscle for breathing. It contributes to various processes such as expectoration, vomiting, swallowing, urination, and defecation. It facilitates the venous and lymphatic return and helps viscera located above and below the diaphragm to work properly. Its activity is fundamental in the maintenance of posture and body position changes. It can affect the pain perception and emotional state.”<sup>1</sup>

Breathing techniques have many benefits in our profession and many of us that work with patients that suffer from persistent pain currently utilize diaphragmatic breathing techniques for relaxation, and improved flexibility in the neck, chest, back, hips, and pelvic floor. We are also trained in certain breathing techniques to improve breathing for patients that have pulmonary conditions. This training can also help to reduce the risk of exacerbation of certain conditions. For example, we may have to educate our patients to “exhale with exertion” so that they do not increase intra-abdominal pressure when lifting or doing extraneous tasks with those that may have disorders such as stress urinary incontinence, hernias, or prolapse. Also, patients may tend to hold their breath in anticipation of pain where educating them on breathing strategies may contribute to improved performance of the task.

The diaphragm is an important muscle that has a strong connection to and cooperates with the pelvic floor and postural muscles.<sup>2</sup> The diaphragm is the primary muscle involved in breathing. “It intervenes to facilitate cleaning of the upper airways through coughing, facilitates the evacuation of the intestines, and promotes the redistribution of the body’s blood.”<sup>3</sup> The diaphragm has non-respiratory functions and can affect the perception of pain and emotional state by analgesic and response functions, also that manual treatment of the diaphragm can not only help the entire body but the patient’s mental well-being.<sup>3</sup>

According to Bordoni et al, they hypothesize that failed back surgery may be related to dysfunction of the diaphragm muscle that is not considered when trying to understand the reasons for failed back surgery syndrome (FBSS)<sup>4</sup> and they state that, “dysfunction of the diaphragm is an important factor and recognized as being one of the causes of low back and sacroiliac joint pain. People who suffer from low back and sacroiliac joint pain often have early fatigue of the diaphragm muscle, altered and diminished respiratory excursion as well as inadequate proprioceptive function.”<sup>4</sup>

Research has demonstrated that exercise programs that have included breathing training 2-3 times per week for 4 to 8 weeks were shown to be effective in improving lung function, reducing back pain, and improving quality of life.<sup>5</sup>

## What can we do to help manage persistent pain with breathing techniques when treating patients?

Educate your patients on the benefits of diaphragmatic breathing and how research demonstrates the physiological and emotional benefits, including but not limited to the following:<sup>1-8</sup>

- Relaxation
- Improve attention.
- Decrease pain.
- Decrease blood pressure.
- Reduce Stress and Anxiety
- Improve respiratory rate.
- Improve mood.
- Maximize the parasympathetic system.
- Improve dysfunctional breathing patterns.
- Overcoming fears

Inform your patient by showing a video or a demonstration that depicts how the diaphragm and chest cavity moves with deep breathing. This visual can help your patients see how deep breathing has physical benefits. Also, the sensation they have after performing proper diaphragmatic breaths can allow them to feel the benefits.

### Why is it important?

When a patient comes to physical therapy it is often due to an issue that revolves around pain. Individuals that are suffering from persistent pain can also have increased stress and anxiety that may cause fear avoidance behaviors with movement. Breathing can help get them through or to a graded exposure phase with activities. For example, fibromyalgia is a condition that causes persistent pain, and exercise has been shown to decrease symptoms. In a study done by Vrouva et al. (2022), they aimed to investigate the change in pain levels when breathing exercises were added to their exercise programs. One group consisted of an exercise program of activities geared to limit pain, and the second group followed the same exercise program, but diaphragmatic breathing exercises were utilized when they reached the pain limit. In conclusion, both groups showed a significant decrease in all characteristics of the pain scales; however, the improvement of the group that had the diaphragmatic breathing added was significantly higher.<sup>9</sup>

Breathing can also be used for stabilization. Research by Oh et al. (2020), reported that utilizing abdominal draw-in lumbar stabilization exercises (ADIM) resulted in reduced dysfunctions, decreased pain, increased muscle thickness in contraction, increased contraction rate, and improved pulmonary function (increased FEV1 and MVV scores), which could ultimately be an effective treatment for those suffering with lumbar instability.<sup>10</sup>

Diaphragmatic breathing has also been shown to decrease pain, improve sustained attention,

decrease negative affect (mood), and decrease cortisol levels.<sup>7</sup> It can also improve the quality of life in the elderly with breast or prostate cancer.<sup>11</sup> Utilizing breathing in combination with core stability exercises had improved outcomes on pain and function in patients that had Mechanical Non-Specific Low Back Pain.<sup>12</sup>

Impaired and ineffective breathing patterns may be contributing to many unexplained symptoms (anxiety, depression, confusion, chest pain, hypocapnia, and breathlessness) in patients with non-specific chronic neck pain.<sup>13</sup> In the clinical considerations cited by Tatsios et al. (2022), “diaphragmatic breathing re-education exercise was proposed to confer benefits under mechanisms of psychosomatic relaxation or via lymphatic system activation, homeostasis of the functions of the whole body, and autonomous nervous system recalibration.”<sup>13</sup>

The utilization of diaphragmatic breathing can help reduce fear avoidance behaviors and has helped individuals who suffer from fear of flying due to motion sickness by helping overcome their fears.<sup>8</sup> Additionally, breathing training may help those that suffer from dysfunctional breathing without any specific pulmonary medical diagnosis.<sup>14</sup>

### **The barriers and difficulties**

Not everyone may buy into the benefits of breathing, and some may feel it has no value. I like to give an example when you think of how your body responds to stress often causing an unconscious or involuntary deep sigh, it is like our body’s innate response to attempt to mitigate the stressors. By being in control of your breathing you can help be in control of your symptoms (pain, stress, worry, insomnia, fear, anxiety, shortness of breath, etc.).

Another difficulty may be in teaching the technique. It is not always as simple as it may sound. Some individuals that are strong chest breathers have a challenging time reversing the way they breathe as an exercise. To some, it seems counterintuitive, and they may be able to properly perform it only to return to their next visit unable to have the technique mastered.

A barrier is that diaphragmatic breathing alone may not be useful for pain reduction but utilizing it combined with exercise and additional integrative medicine techniques such as mindfulness, nutrition, and sleep hygiene may increase its effectiveness.

### **Summary**

Diaphragmatic breathing practices can help manage physiological and psychological conditions. Research has found that it can help improve pulmonary function and decrease pain, promote relaxation, and improve physical and mental states. Finally, the diaphragm should be investigated by physical therapists in individuals that are being treated for persistent pain. According to Bordoni, when the diaphragm is treated manually it also can treat the psyche improving the patient’s physical and mental well-being.<sup>3</sup>

Physical therapists can utilize the benefits of breathing as a therapeutic activity, neuromuscular re-education, and therapeutic exercise based on what you are targeting to improve. It can help to utilize resources to help patients with apps, videos and/or handouts that explain the benefits of breathing.

In conclusion, diaphragmatic breathing is another tool in our integrative medicine cabinets that is cost-free and drug-free.

**As a reminder, our APTA Michigan Pain SIG website has numerous resources to investigate which can be found here: <https://aptami.org/sigs/pain-sig-2/>. If you are not already a member, please consider joining our Facebook group where we share information and upcoming events <https://www.facebook.com/groups/301084173895665>.**

## REFERENCES

1. Bordoni B, Marelli F, Morabito B, Sacconi B. Manual evaluation of the diaphragm muscle. *Int J Chron Obstruct Pulmon Dis*. 2016 Aug 18;11:1949-56. doi: 10.2147/COPD.S111634. PMID: 27574419; PMCID: PMC4993263
2. Tim S, Mazur-Bialy AI. The Most Common Functional Disorders and Factors Affecting Female Pelvic Floor. *Life (Basel)*. 2021 Dec 14;11(12):1397. doi: 10.3390/life11121397. PMID: 34947928; PMCID: PMC8704638.
3. Bordoni B, Marelli F, Bordoni G. A review of analgesic and emotive breathing: a multidisciplinary approach. *J Multidiscip Healthc*. 2016 Feb 29;9:97-102. doi: 10.2147/JMDH.S101208. PMID: 27013884; PMCID: PMC4778783.
4. Bordoni B, Marelli F. Failed back surgery syndrome: review and new hypotheses. *J Pain Res*. 2016 Jan 12;9:17-22. doi: 10.2147/JPR.S96754. PMID: 26834497; PMCID: PMC4716715.
5. Anderson BE, Bliven KCH. The Use of Breathing Exercises in the Treatment of Chronic, Nonspecific Low Back Pain. *J Sport Rehabil*. 2017 Sep;26(5):452-458. doi: 10.1123/jsr.2015-0199. Epub 2016 Aug 24. PMID: 27632818.
6. Hopper SI, Murray SL, Ferrara LR, Singleton JK. Effectiveness of diaphragmatic breathing for reducing physiological and psychological stress in adults: a quantitative systematic review. *JBI Database System Rev Implement Rep*. 2019 Sep;17(9):1855-1876. doi: 10.11124/JBISRIR-2017-003848. PMID: 31436595.
7. Ma X, Yue ZQ, Gong ZQ, Zhang H, Duan NY, Shi YT, Wei GX, Li YF. The Effect of Diaphragmatic Breathing on Attention, Negative Affect and Stress in Healthy Adults. *Front Psychol*. 2017 Jun 6;8:874. doi: 10.3389/fpsyg.2017.00874. PMID: 28626434; PMCID: PMC5455070.
8. Shiban Y, Diemer J, Müller J, Brütting-Schick J, Pauli P, Mühlberger A. Diaphragmatic breathing during virtual reality exposure therapy for aviophobia: functional coping strategy or avoidance behavior? a pilot study. *BMC Psychiatry*. 2017 Jan 18;17(1):29. doi: 10.1186/s12888-016-1181-2. PMID: 28100203; PMCID: PMC5242013.
9. Vrouva S, Sapidou V, Koutsoumpa E, Chanopoulos K, Nikolopoulou A, Papatsimpas V, Koumantakis GA. Can Exercise Affect the Pain Characteristics in Patients with Fibromyalgia? A Randomized Controlled Trial. *Healthcare (Basel)*. 2022 Nov 30;10(12):2426. doi: 10.3390/healthcare10122426. PMID: 36553951; PMCID: PMC9778432
10. Oh YJ, Park SH, Lee MM. Comparison of Effects of Abdominal Draw-In Lumbar Stabilization Exercises with and without Respiratory Resistance on Women with Low Back Pain: A Randomized Controlled Trial. *Med Sci Monit*. 2020 Mar 17;26:e921295. doi: 10.12659/MSM.921295. PMID: 32182226; PMCID: PMC7100066.
11. Shahriari M, Dehghan M, Pahlavanzadeh S, Hazini A. Effects of progressive muscle relaxation, guided imagery and deep diaphragmatic breathing on quality of life in elderly with breast or prostate cancer. *J Educ Health Promot*. 2017 Apr 19;6:1. doi: 10.4103/jehp.jehp\_147\_14. PMID: 28546966; PMCID: PMC5433629.
12. Shah S, Shirodkar S, Deo M. Effectiveness of core stability and diaphragmatic breathing v/s core stability alone on pain and function in mechanical non-specific low back pain patients: a randomised control trial. *Int J Health Sci Res*. 2020; 10(2):232-241.
13. Tatsios PI, Grammatopoulou E, Dimitriadis Z, Koumantakis GA. The Effectiveness of Manual Therapy in the Cervical Spine and Diaphragm, in Combination with Breathing Reeducation Exercises, in Patients with Non-Specific Chronic Neck Pain: Protocol for Development of Outcome Measures and a Randomized Controlled Trial. *Diagnostics*. 2022; 12(11):2690. <https://doi.org/10.3390/diagnostics12112690>
14. Hagman C, Janson C, Emtner M. Breathing retraining - a five-year follow-up of patients with dysfunctional breathing. *Respir Med*. 2011 Aug;105(8):1153-9. doi: 10.1016/j.rmed.2011.03.006. Epub 2011 Mar 31. PMID: 21454062.