Bowenwork, Biofeedback and Anxiety

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Abstract: Utilizing capnometry as a measurement of physiological change, a case study is presented demonstrating an increased level of partial pressure of carbon dioxide (pCO_2) in a comparison of mindfulness diaphragmatic breath training versus Bowenwork procedures BRM1 and BRM2. Increased pCO_2 is indicative of increased oxygenation of tissues and cells. Implications for further research are introduced.

Introduction: What is biofeedback training?

As stated in a previous article, biofeedback utilizes various sensors placed on the patient's body to record a physiological pattern in real time and display it on a computer screen to the patient. When a dysfunctional pattern is identified, the biofeedback therapist guides the patient first through a series of different thoughts, emotions, and alternative patterns and then to identify psychological and physiological triggers for the dysfunctional pattern. Alternative, healthier patterns are identified and reinforced using the same sensors and display. Through this training, the patient becomes increasingly mindful of his or her habitual dysfunctional pattern so that in future scenarios, even without access to biofeedback sensors and display, he or she can then choose to perform the healthier pattern and have the healthier reaction associated with it.

Introduction: What is Bowenwork?

Bowenwork is a hands-on bodywork modality that consists of a series of gentle cross-fiber stimulations over specific muscles, tendons, ligaments or nerves. Periodic pauses with no hands-on contact are included in Bowenwork sessions in order to allow the body to incorporate the new information. During the course of a session, the responses of proprioceptors and fascia lead to a rebalancing of the autonomic nervous system, which benefits the entire body in addition to addressing the specific musculoskeletal or visceral problems for which the client has sought attention. Sessions are generally scheduled at least a week apart in order to give the body time to further integrate the changes initiated during the session.

Using biofeedback and Bowenwork with anxiety

Both biofeedback and Bowenwork have developed protocols and procedures that manage pain associated with anxiety (Khazan, Sherman, Rentsch). Having had training in both methods, I sought to compare the impact of Bowenwork combined with mindfulness training to the use of mindfulness alone. In both cases I utilized the biofeedback modality known as capnometry because of its ability to measure and display a breathing pattern highly correlated with anxiety.

History

K.P. is a 52 yr. female who came to me with complaints of bilateral shoulder pain, neck pain, and bilateral elbow pain. She works as a hairdresser and although she has not missed work, she had previously described several episodes of having to "crash" at the end of a day, or sometimes waking up in the morning on a weekend with the pain and subsequently being confined to bed all day. Her initial presentation exhibited some moderate distress with a significant component of anxiety: As she told me the story of her pain, I observed her fast-

paced, uninterrupted talking and very shallow chest breathing. She reported that she has been a "fast talker" all her life and tells stories to her clients in this manner daily.

Method

Capnometry was chosen to measure and compare changes due to the prevalent theory of habitual over-breathing as a contributor to anxiety and panic attacks. Over-breathing is the behavioral mismatch of the rate and depth of breathing, resulting in ventilating out too much carbon dioxide (CO_2), which lowers blood levels of CO_2 and leads to a condition called hypocapnia (Khazan). Stated physiologically, when there is not enough CO_2 in the blood, the acid-base level of the blood (pH = "potential of hydrogen") changes to an alkaloid state. This change in pH influences hemoglobin to not release oxygen (O_2) to the tissues; the tissues respond to the lowered O_2 by sending a panic signal to the brain; the brain responds by increasing the breathing rate still further, *i.e.,* "over-breathing." If the person does not make a conscious effort to slow the breath with longer exhales, allowing the CO_2 levels in the blood to build and thereby lowering the pH level, the pattern will continue. Hence, we witness people who suffer from anxiety often gasping for air between rapid and shallow breaths. (Laffey *et al*)

Capnometry measures breathing patterns by utilizing a nasal cannula attached to a machine that records the breath response and, at the end of each exhalation, calculates the presence and degree of over-breathing. The measurement of end-tidal pCO_2 is computed in mm of mercury (mmHg). Rates above 45 are considered optimal breathing; rates of 35-45 are considered normal breathing; 30-35 indicates mild over-breathing; 25-30 indicates moderate over-breathing; 20-25 indicates severe over-breathing. (Litchfield) The capnometer also records breathing rate as breaths per minute.

The plan was to address K.P.'s complaints and compare results obtained with one session each of two therapeutic methods, with one week between sessions.

In the first method, mindfulness diaphragmatic breath training, breathing analysis and guidance were performed utilizing mindfulness techniques and capnometry. In a seated position, the patient watched her breath pattern being recorded on a computer screen. She received visual feedback of her inhale/exhale pattern via a line on the screen tracing an up-and-down motion while simultaneously hearing audio feedback of rising and falling tones. She was guided using this feedback to perform a diaphragmatic breathing pattern with shorter, less forceful inhales and longer, relaxed exhales. Instructions included paying significant attention to feelings of change occurring as she watched and heard the breath pattern change on the screen.

In the second method, Bowenwork, capnometry was utilized during performance of two standard procedures for balancing the lower back ("BRM1") and upper back ("BRM2"). Following a brief check-in and refreshing K.P. on her prior education about over-breathing versus diaphragmatic breathing, she assumed the traditional prone position upon a table with a face cradle in preparation for Bowenwork. The laptop/tablet measuring the capnometry was placed on the floor below the opening of the face cradle. This allowed her to receive the same visual and audio feedback screen she was familiar with in the previous teaching session. However, because it is physically difficult to maintain open eyes through a face cradle for the entire treatment time, K.P. was instructed to occasionally look at her

results only if she wished and mostly to “allow [her] body to accept whatever feelings occur.” If she chose not to open her eyes, the audio feedback of rising and falling tones was still present.

Results

Overview:

Figure 1 shows capnometry data during 20 minutes of diaphragmatic breath training. Figure 2 shows data from 20 minutes of Bowenwork. Each figure contains two rows of data obtained over the entire session, with each bar showing the average of readings taken during the previous 20 seconds. The top row in each figure shows the pCO_2 averages; the bottom row shows the breaths/minute rate.

Results in Figure 1:

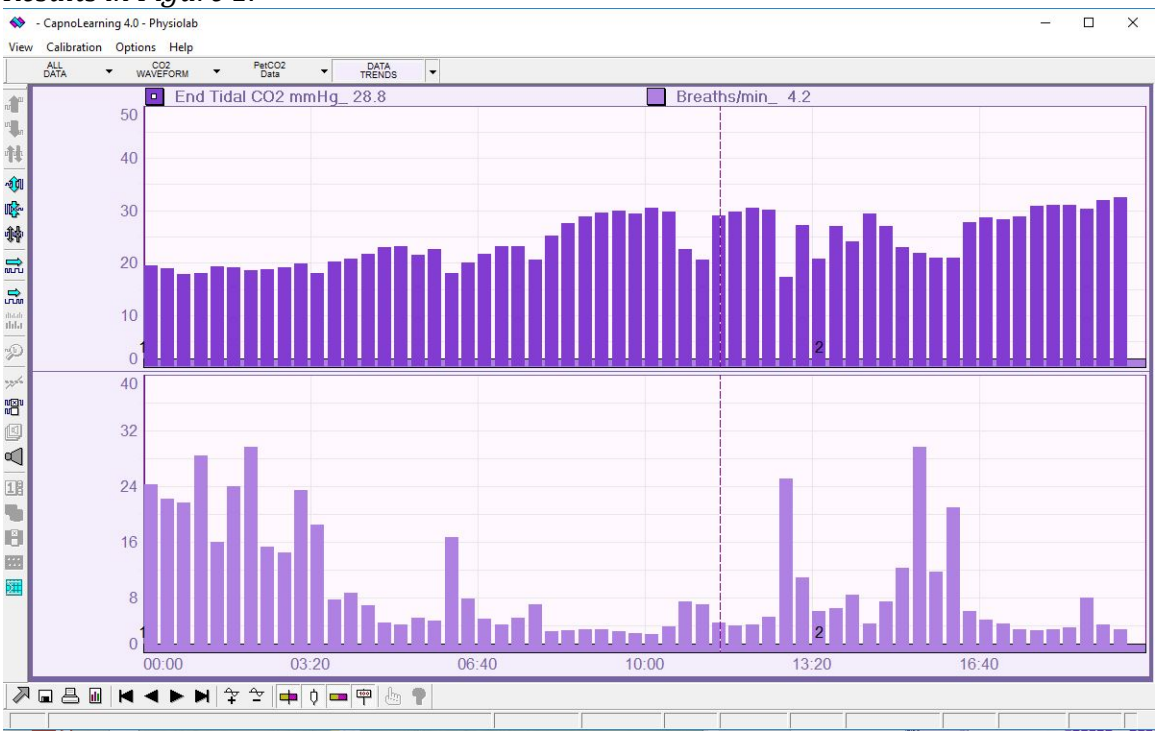

Figure 1: Capnometry recording during diaphragmatic breathing training

Top graph: Comparing the first 20 seconds (left-most bar) to the last 20 seconds (right-most bar), one can see that the end-tidal pCO_2 began around 20 mmHg (severe over-breathing) and ended about 30mmHg (moderate over-breathing). The average end-tidal pCO_2 over the entire 20-minute session was 28.8mmHg.

Bottom graph: The breathing rate was initially fast and then slowed, with a brief period of increased rate during a discussion of some of the awareness feelings of a diaphragmatic breath. The average rate over the entire session, 4.2 breaths/minute, is what many would consider to be a slow meditative rate.

Results in Figure 2.

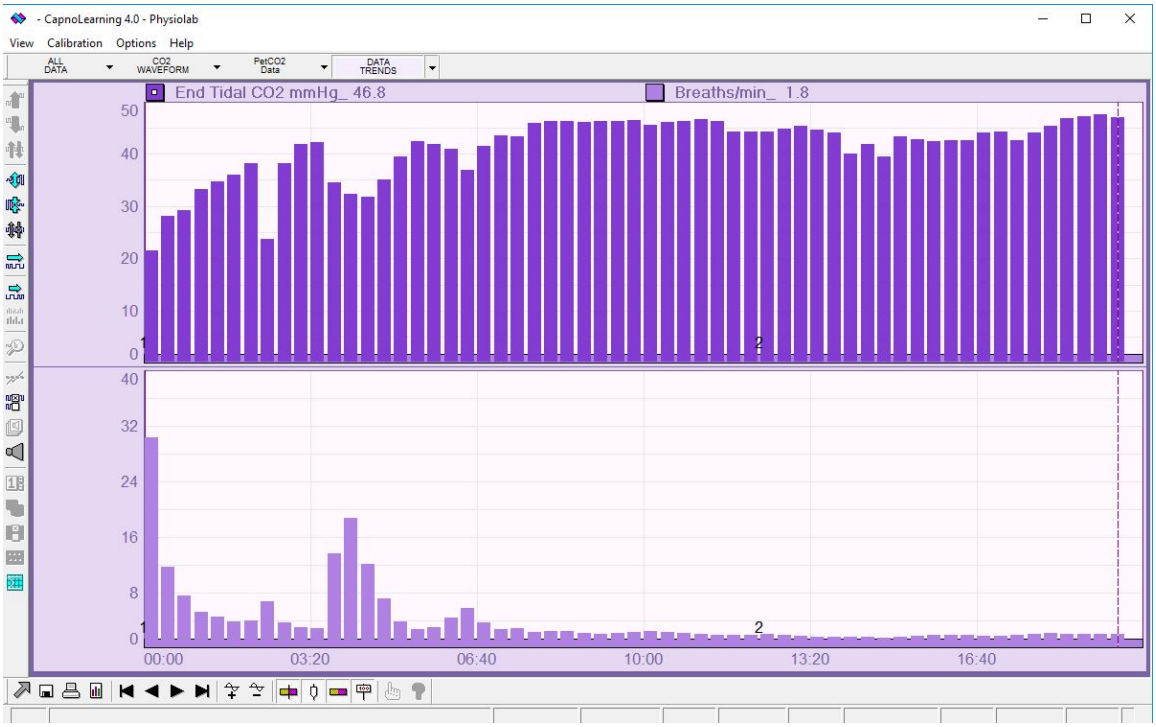

Figure 2: Capnometry measurement during Bowenwork BRM 1 and BRM 2

Top graph: The first three bars on the left represent the first 60 seconds of K.P.'s session in the prone position, and record that she has begun about where she left off with training the week prior, at the end-tidal pCO_2 "moderate over-breathing rate" of 20 - 30mmHg. BRM1 was initiated at approximately 2 minutes into the data collection. By the 6:40 mark the rate climbed into the higher 30's and 40's during the session, with a peak of 47.3 and an average for the entire session of 46.8, which is considered "optimal breathing."
Bottom graph: It seems appropriate to look at the data from a left half and a right half, splitting at the 6:40 mark. There are 20 data points marking breath/min. rate prior to the 6:40 mark. The range has a low of 2.6 and a high of 30.1 with an average of 7.56 breaths per minute. Following the 6:40 mark there are 39 data points marking breath/min. rate from a low of 1.4 to a high of 3.5 with an average of 1.84 breaths/min.

Discussion
Comments K.P. made about the biofeedback mindfulness practice focused upon finding the awareness of deep breathing as calming, an experience she was not familiar with having. She watched the screen constantly as instructed, and said she found the science of it fascinating. Following the session, she exhibited less anxiety and expressed appreciation for the service.

Physiologically, it is interesting to note that while the biofeedback training increased her pCO_2 from 20 to slightly over 30, and lowered her breath rate to what many would consider a meditative breath, the average pCO_2 level of ~30 is still considered to be moderate over-breathing. It is likely that her habitual breathing pattern was so significantly dysfunctional that even bringing her into a moderate level of hypocapnia provided a benefit.

Comments K.P. made about the Bowenwork with biofeedback session included three main points: One, although she was consistently receiving good feedback through the audio tone pattern of inhale/exhale, during the moments of occasional peering through the face cradle to glance at the data collection she felt instantly very rewarded as if she was winning a game. Two, as her eyes shut, she would feel a moment of anxiety, fearing that she would not be able to maintain such an elevated level. Three, she could quickly dispel the moment of anxiety by focusing on how completely relaxed her body was becoming. In summary, after the Bowenwork session her anxiety was reduced not just emotionally, but physically as well. She mentioned a sense of confidence that she would be able to sustain this relaxed state after experiencing the mental trials of performance anxiety and the success of redirecting her focus to physically relaxing herself. This ability to accept what is occurring and to redirect attention is a key fundamental of mindfulness training.

Physiologically, the results of the Bowenwork session demonstrate an increased level of pCO_2 to a level of optimal breathing or pH balance. We also can see that her breath rate was significantly slowed to a meditative level, but this time while maintaining efficient pCO2 levels. Can we say that during this treatment she was getting healing "on a cellular level"? It is unclear because we were not measuring anything on a cellular level. However, we can state that increased pCO_2 reflects that more oxygen was available for tissues and cells, thus allowing them to be nourished and to accelerate healing.

It is important to note several limitations of this study that will guide myself and hopefully other practitioners toward further research. One, this is a case study not a controlled randomized study. The model will need to be adapted to accepted standards for publication. Additionally, this model is fraught with methodology inconsistencies, such as making measurements with the patient/client in two distinct physical positions as well as having the subject more attentive in one application and less so in another. Finally, although the capnometry did show improvement on both measures between biofeedback and Bowenwork, no statistical analysis was performed to demonstrate significance.

Since it has been demonstrated that capnometry can measure changes stimulated by the application of Bowenwork, it might be interesting to measure such changes in clients who have not previously experienced biofeedback training. That would also make possible a comparison of the effects of Bowenwork alone with those of biofeedback alone and with the two used together, as in this instance.

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