

Anxiety, CO2 tolerance, and breath practice in high school students: feasibility and observations of a 6-week slow breathing program

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Purpose

One in 3 American adolescents meet the criteria for anxiety, and suicide is the second leading cause of death globally among 15-29 year-olds. Research supports connections between breathing manipulation and emotional states, and tolerances to endogenous carbon dioxide (CO2) levels and anxiety. We observed students' short and long-term anxiety and CO2 tolerance (CO2T) during a slow-breathing program at a rural Pennsylvania high school.

Methods

A 6-week, slow-breathing program was administered to 26 10th-12th grade students in 2 health/physical education (HPE) classes. Three times/week, an HPE teacher led students through 5 minutes of 5-second inhales, 5-second breath holds, 10-second exhales, and 5-second breath holds. The State-Trait Anxiety Inventory (STAI) Trait ("overall" anxiety) Scale was administered at the beginning and end of the 6 weeks. The short version of STAI-State ("in-the-moment" stress) Anxiety Scale and a timed-exhale CO2T measure were administered once/week before and after the breath practice.

Results

Of 26 students, 20 (73%) completed all 6 weekly state anxiety and CO2T measurements; 6 completed 5 of 6; and 1 completed 4 of 6. After 6 weeks, 73% (n=19) of participating students showed improved trait anxiety scores (mean 12.3% improvement).

Before vs. after the breathing exercises, state anxiety and CO2T scores improved among all participants:

- A weekly average of 12% and 11%, respectively;
- A 6-week average of 15% and 8.6%, respectively.

From weeks 0 - 6:

- Mean daily (pre-and-post breathing practice) CO2T scores improved on average 30%;
- Both pre- and post-breathing CO2T scores improved by 44% and 37%, respectively.

Conclusions

A 6-week high school program of thrice-weekly, 5-minute group slow breathing was feasible and was associated with short- and long-term adaptations to stress and endogenous CO2. Prospective studies are warranted to confirm the potential benefits of simple, low-cost approaches such as these towards ending the stress-management crisis among today's youth.