

LETTER TO THE EDITOR

Breath holding as a specific type of breathing training from the viewpoint of Avicenna

Authors' reply We wish to thank Gorji et al¹ for their comment on our study on the effects of breathing exercise in heart failure patients by putting its results in a wider historical context, while underlining the inestimable contribution of Avicenna to medicine. We have to add that, besides the cited works of Avicenna, breathing exercises constitute an important part of several other time-honored practices, frequently positioned on the frontier between medicine, religious practice, and personal health and fitness. Such practices, involving in most cases slow, deep, and regular breathing, include for instance yoga mantras, rosary prayer, or tandem breathing performed by zen practitioners.

Of course, breath holding (BH) described by Avicenna and slow breathing (SB) do share many common features, but there are also some major differences which make BH and SB two distinct types of breathing exercise. Both deep SB and BH (when performed after deep inspiration) activate lung stretch receptors, with an immediate effect of inhibiting vagal control of heart rate, thus inducing respiratory sinus arrhythmia. Prolonged lung inflation present in both cases may also induce peripheral vasodilation due to sympathetic inhibition. In both cases, the modified respiratory pattern is also responsible for changes in intrathoracic pressure. These changes modify venous return with consequent modulation of cardiac stretch receptors. They also cause oscillations in blood pressure countered by arterial baroreflex.² As far as differences are concerned, BH usually involves the Valsalva maneuver with a major increase in intrathoracic pressure, not present in SB if properly performed. Moreover, prolonged BH may briefly reduce blood oxygenation. Conversely, SB in hypoxic conditions such as CHF or high-altitude exposure was shown to have a pronounced opposite effect with an increase in blood oxygen saturation.^{3,4} Obviously these differences do not imply that one technique is superior to the other, but they merely indicate that they are not to be considered equivalent.

With the available laboratory techniques, it is relatively straightforward to demonstrate immediate cardiovascular effects of altered breathing pattern but it is more difficult to show the long term effects of regular breathing exercises. This is because such exercises are difficult to standardize, the subjects' adherence is variable, and the effect size may be modest. It is also difficult to perform high-quality trials because of the difficulty with proper control (there is no perfect

“placebo” for this type of exercise). Moreover, it is not easy to distinguish purely physiological responses to the exercises from their psychological effects, given that breathing exercises are frequently perceived as relaxing. Nonetheless, the available evidence suggests that SB may indeed provide long-term cardiovascular benefits represented by blood pressure lowering and sensitization of arterial baroreflex.²

The information on health and well-being effects of respiratory exercises coming from historical sources dealing with traditional medicine and philosophy may be extremely valuable and stimulating. Having said this, notwithstanding the difficulties described above, the duty of modern medicine is to provide evidence on the ability of such approaches to produce actual benefits in patients. Such evidence should derive from studies performed according to valid scientific methods. We sincerely hope that our work meets these criteria.⁵

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