

7.6.1c Records with measurable indicators on the overall impact of various Yogic Principles/Philosophy/tools etc across various segments and health dimensions

University of Patanjali follows *Ashtanga-Yoga* enunciated by Sage Patanjali. Additionally, the knowledge of *Jnana yoga*, *Bhakti yoga*, *Karma yoga*, *Hatha yoga* and *Mantra yoga* is also taught to the students at graduate and post graduate level to enhance their own and others psycho-physiological health.

In modern time, not only India but numerous countries have recognized Yoga as a basic tool for healthy life followed by various experiments. Yoga aligns our body and stamps out various illnesses which range from primal level to incurable diseases. Yoga regulates our mind and helps us to conduct our works in an efficient manner and hence devising a cheerful and a festive life.

The studies related to the effect of yoga on different health parameters are mentioned below:



**Yogic Gut Aeration Techniques to Inhibit *Helicobacter Pylori* Induced Acid Peptic
Diseases**

Thesis submitted for the award of
Doctoral of Philosophy (Yoga Science)

To the University of Patanjali

By

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UNIVERSITY OF PATANJALI

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year 06

Haridwar-249405, Uttarakhand, India

2017- 2022



Abstract

Background: The most common cause of acid-peptic symptoms is *Helicobacter Pylori* (*Hp*) infection. Proton-Pump Inhibitor (PPI) is conventionally used for managing the acid secretion in the stomach. And once the PPI is prescribed people keep taking for years without even consulting a doctor. Long-term consumers develop resistance against PPI with a few side effects. The global market of PPI is increasing the economic burden on the patient as well as on the nation which can be avoided. *Hp* being microaerophilic, can be inhibited by gut aeration. Using air-drinking technique, patients who are long consumers of PPI can be weaned off the medicines.

Aim and Objective: The study was planned to assess the efficacy of *Yogic* Gut Aeration Techniques (YGATs) on *Hp* induced Acid-Peptic Disease (APDs), stress-level and quality of life of the patients with *Hp* induced APDs.

Method: Patients having epigastric pain, gastric reflux, and stomach burning were screened and allowed to go through endoscopy followed by Rapid Urease Test (RUT) to screen *Hp* infection. 34 patients with positive RUT were randomly assigned into 2 groups. *Yoga* group (n=16) received YGATs for 2 months and 7 days in addition to PPI. Control group (n=18) were provided only PPI. Signs and symptoms of APD and its co morbidities (stress and quality of life) were measured by using Gastrointestinal Symptom Rating Scale (GSRs), Quality of Life for reflux and disease (QOLRAD), and Stress indicator questionnaire (SIQ).



Result: Mixed ANOVA for intra and inter comparisons by using 24th version of IBM-SPSS showed significant reduction in Gastro-intestinal (GI) symptoms namely epigastric pain, gastric reflux, stomach burning, etc., ($p < 0.001$), level of stress ($p < 0.001$) and improvement in QOL ($p < 0.001$) in the *Yoga* group as compared to the Control group.

Conclusion: YGATs may be a harmless and inexpensive alternative or add-on therapy for moderate intensity of APDs and its psychological co morbidities.

Keywords: *Yoga*, YGATs, Acid peptic diseases, Gastric ulcers, *Hp*.

Clinicaltrials.gov identifier- CTRI/2018/12/016506



**EFFECTS OF TWO YOGA BREATHING TECHNIQUES ON
AUTONOMIC AND COGNITIVE FUNCTIONS**

Thesis submitted for the award of
Doctor of Philosophy (Yoga Science)
To the University of Patanjali

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Year 2021



ABSTRACT

Background

It is estimated that approximately one in four adults suffers from an anxiety disorder at some point in their lives (Murrough, Yaqubi, Sayed & Charney, 2015). Studies suggest that stress and anxiety can (i) shift the autonomic balance towards sympathetic dominance (Dimitriev, Saperova, Dimitriev & Karpenko, 2014) and (ii) affect the cognitive ability of a person (Derakshan & Eysenck, 2009), as anxiety can decline the ability to maintain attention and focus (Najmi, Kuckertz & Amir, 2012). Hence poor attention and increased sympathetic activity could lead to physiological arousal and inability to complete tasks requiring focused attention. There are few published reports on the effects of different *pranayamas* on attention as well as on the regulation of the autonomic balance (Telles, Yadav, Gupta & Balakrishna, 2013; Joshi & Telles, 2009; Telles, Raghuraj, Arankalle and Naveen, 2008; Stancák, et al. 1991a; Stancák, et al. 1991b). However these studies have methodological limitations such as (i) assessments for attention tasks, autonomic variables and anxiety were not done in the same session, (ii) in most studies attention was not assessed using an objective measurement such as the P300 task, (iii) lack of an interventional-control group, and (iv) a small sample size.

The present study was designed to examine the acute effects of two specific yoga breathing techniques i.e., (i) high frequency yoga breathing or *kapalabhati pranayama* and (ii) bellows yoga breathing or *bhastrika pranayama* on measures of attention and arousal assessing (i) the P300 Event related Potential (using the auditory odd-ball paradigm) which is used to assess the stimulus processing speed and efficiency of the brain and neural resources available during the performance of attention task, (ii) a six letter cancellation task (SLCT) which assesses sustained attention, motor speed and visual scanning, (iii) heart rate variability and respiration which are



indicators of cardiac autonomic control and physiological arousal and (iv) state anxiety using the Spielberger's state and trait anxiety inventory (STAI).

Aims

The present study was aimed to see (1) the effects of two specific yoga breathing techniques on (i) attention, (ii) autonomic balance, and (iii) state anxiety and (2) whether the voluntarily regulated breathing techniques can improve attention without increasing sympathetic activity during an attention task.

Objectives

To examine the effects of (i) *kapalabhati pranayama* and (ii) *bhastrika pranayama* on

1. P300 event related potential using the auditory oddball paradigm
2. Heart rate variability and respiration rate
3. Six letter cancellation test (SLCT)
4. State anxiety

Methods

Participants

Thirty eight adult males were recruited for the study with ages between 20 and 37 years (group mean age \pm S.D., 24.1 \pm 4 years). The sample size was calculated based on effect size of previous study on *kapalabhati pranayama*. The study was conducted in Patanjali Yogpeeth, Haridwar, India. A signed informed consent was collected from all of the participants before they



enrolled in the trial. The project had approval of the Institutional Ethical Committee of Patanjali Research Foundation.

Design

Each participant was assessed for four separate sessions *viz.*, two yoga breathing techniques i.e., bellows yoga breathing or *bhastrika pranayama*, and *kapalabhati pranayama* and two control sessions (i.e., breath awareness and quiet sitting) on four consecutive days. Hence for 38 participants there were 38×4 sessions = 152 sessions. The participants were allocated randomly to each of the four sessions. The duration of each session was 38 minutes consisting of 10 minutes pre (5 minutes for the assessment of the P300 and HRV + 5 minutes for the assessment of SLCT and STAI), 18 minutes during, and 10 minutes post (5 minutes for the assessment of the P300 and HRV + 5 minutes for the assessment of SLCT and STAI).

Assessments

P300 ERP

Nicolet EDX system (Natus Medical Inc, USA) was used to record the P300 ERP (with auditory oddball paradigm). Recordings were with the following amplifier settings: low frequency filter 0.05 Hz, high frequency filter 30Hz, sensitivity 100 microvolts,, sweep width 750 ms with 75 ms delay and number of averaged sweeps per recordings 300. Acoustically shielded earphones were used to deliver the binaural tone stimuli (i.e., frequent and rare tone stimuli). The stimulus intensity was kept at 80 dB SPL. The 'frequent' tone stimuli had a frequency of 1 KHz, plateau of 50 cycles, ramp of 10 cycles and occurred with a frequency of 80% of all tones. The 'rare' stimuli had a frequency of 2 KHz, plateau of 10 cycles, ramp of 20 cycles, and occurrence was



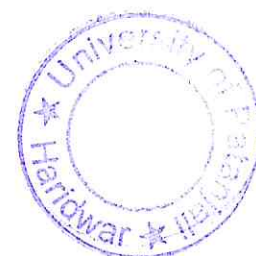
20%. The averaged event related potentiation was observed from active electrodes at Fz, Cz, and Pz scalp sites which were referenced to linked earlobes (A1-A2), with the ground electrode at forehead (FPz). The rejection level was set at 90%. The electrode impedances at all sites were kept below 5 K Ω throughout the session.

Heart Rate Variability and Respiration Rate

A two channel ECG and respiration system (BIOPAC System Inc, USA; MP 45 Biopac Student Lab system) was used to assess the heart rate variability (HRV) and respiration rate. Standard limb lead I configuration were applied to record the data with a sampling frequency of 1084 Hz using pre-gelled Ag/AgCl electrodes. The respiration rate was recorded using a respiratory transducer which was fastened using a belt approximately 8 cm below the lower costal margin when the participant sat erect.

Six Letter Cancellation Test

The six-letter cancellation test (SLCT) consists of randomly arranged letters of the alphabet in a A4 size sheet in an array of 22 rows and 14 columns. The six target letters (i.e., letters which a participant is instructed to cancel in the sheet) are given at the top of the sheet. The participants were told to cut as many target letters as they could in the test sheet within 90 seconds. Participants could either (i) select a single target letter at a time and cut all six letters one by one or (ii) cut all six letters at once. The participant could follow vertical, horizontal or random paths to cancel the letters. To compensate test-retest and memory effects different worksheets for the SLCT were used before and after the intervention. Also the worksheets used in a session were not used in another sessions to prevent learning influencing the scores. The worksheets were made different by altering target letters and using different randomized array of letters.



Spielberger State- Trait Anxiety Inventory (STAI)

Spielberger state- trait anxiety inventory (STAI) was used to measure the state anxiety. The STAI comprises of twenty items which are measured on a 4-point Likert scale. The Scale is interpreted as: 1 = Not at all, 2 = Somewhat, 3 = Moderately, or 4 = Very much so.

Visual Analog Scale

Visual analog scale is used to measure certain characteristics and attitudes that are generally difficult to directly measure. Here it was used to assess the quality of the interventions practiced by a participant. Visual analog scale consisted of a 10 cm horizontal line with word descriptors at the two ends. Participants were asked to rate their quality of practice immediately after each of the four sessions by placing a vertical mark on the horizontal line representing how well they could follow the instructions given for the pranayama or control sessions.

Interventions

High Frequency Yoga Breathing or *Kapalabhati Pranayama*

To practice *kapalabhati pranayama* the person was asked to sit in a meditative posture (*sukhasana*) keeping their legs crossed with their spine and head erect. Throughout the practice the person was told to keep his eyes closed and both hands resting on respective legs. The person was asked to rapidly inhale and exhale with force and contract the abdominal muscles during exhalation. The abdominal muscles get 'expanded' when inhaling and get 'contracted' when exhaling, while the breath rate was maintained at approximately 60 breaths/ minute during the practice.



Bellows Yoga Breathing or *Bhastrika Pranayama*

To practice bellows yoga breathing or *bhastrika pranayama* the participant were asked to sit crossed legged with their spine and head erect. Throughout the practice the person was told to keep his eyes closed and both hands resting on respective legs. The practice of *bhastrika pranayama* involves deep and long inhalation and exhalation. In this practice emphasis is given more on the volume of air inhaled and exhaled while the breath rate was maintained at 8-12 breaths/minute during the practice.

Breath Awareness (Interventional-Control)

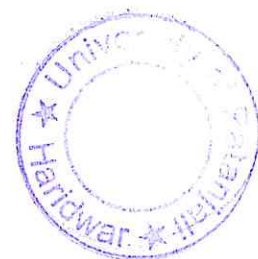
This practice involves being aware of the breathing without changing it. The participants were instructed to sit quietly, cross-legged like in the above two interventions. They were asked to maintain their focus on the flow of air as it enters and comes out of the body. Practice of yoga breathing is inclusive of being aware of one's breath, hence breath awareness was selected as an alternate intervention.

Quiet Sitting (Control Session)

The participants were asked to sit in a comfortable meditative posture with ease. They were asked not to control their breath and/or their thoughts and just sit quietly. Their breath rate was normal and they were allowed for random thinking.

Data Analysis

Separate repeated-measures analysis of variance (RM-ANOVAs) were performed to analyze the data using IBM-SPSS version 24.0 for two yoga breathing techniques (*pranayamas*) i.e., *kapalabhati pranayama*, and *bhastrika pranayama* and two control sessions i.e., breath



awareness and quiet sitting. Considering that separate RM-ANOVAs were performed for each of the variables, there were multiple RM-ANOVAs. Each RM-ANOVA contained two Within-subjects factors i.e., Sessions (with four levels i.e., two *pranayamas* and two controls) and States (with two levels: Pre and Post). Further *post-hoc* analyses with Bonferroni adjustment were done for multiple comparisons.

Results and Discussion

Kapalabhati Pranayama

A significant increase in P300 peak amplitude at Fz, Cz and Pz was observed as well as a significant decrease in P300 peak latency at Pz after 18 minutes of *kapalabhati pranayama*. This suggests that *kapalabhati pranayama* practiced at 60 breaths per minute might improve attention characterized by increased neural resources in attentive task as well as a faster processing speed of stimuli categorization and cortical processing. Also, a significant increase in the total attempts and net scores of SLCT as well as a decrease in state anxiety was noted following *kapalabhati pranayama*. Six letter cancellation test measures sustained attention, shifting attention and visuomotor speed. *Kapalabhati pranayama* seems to improve these aspects of cognition as well, along with decreasing anxiety.

Bhastrika Pranayama

Bhastrika pranayama increased P300 peak amplitude at Fz and Cz and showed a trend of parasympathetic activation after the practice. There was an increase in mean RR intervals, HF power, NN50 and pNN50 components as well as a decrease in LF power, heart rate and LF/HF



ratio following *bhastrika pranayama*. Also, the scores of STAI decreased. These changes suggest an increase in attention as well as a simultaneous parasympathetic dominance.

Breath Awareness and Quiet Sitting

Breath awareness showed an increase in RMSSD and LF/HF ratio after the practice while quiet sitting showed no changes.

Conclusion

The present findings suggest that *pranayama* practices may improve attention without sympathetic arousal (*kapalabhati pranayama*) or with parasympathetic activation (*bhastrika pranayama*), as well as reduce anxiety. This is important considering the negative health effects of prolonged sympathetic arousal. These findings also encourage the use of these yoga breathing practices in therapeutic settings.



**EFFECT OF YOGA ON EMOTIONAL INTELLIGENCE AMONG
COLLEGE STUDENTS OF ROHTAK, HARYANA: A
QUESTIONNAIRE BASED STUDY**

Thesis submitted for the award of
Doctor of philosophy, Yoga Science
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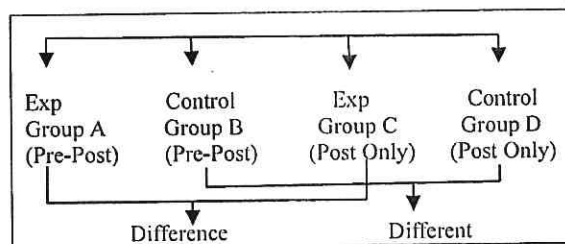
Introduction discusses about the background details of Effect of Yoga on Emotional Intelligence (EI). How to overcome Arjuna’s emotional dilemma during the Mahabharata war? Emotions can be tackled intelligently and this (Radhakrishna, 1948; 1977) was beautifully elucidated by Lord Krishna using the different yogic methods. Yoga is a skillful mental relaxation exercise (Nagarathna & Nagendra, 2003) is used in this study.

Research problem: How EI can be improved using alternative knowledge systems?

Objective: The major objective is to measure EI with and without Yoga intervention of college students using Multi-measure of Emotional Intelligence (MMEI) established Scale (Developed and established by Kurukshetra University, Haryana, 2003). The minor objectives of the thesis are to measure the Self-awareness, the ability to manage emotions, ability to motivate oneself, empathy, the ability to handle relationships using same scale.

Literature Review contains review of the literature with 150 research articles, 30 books and magazines.

Methodology discusses the methodology used in performing the study. Out of a sample of 800 participants from 8 colleges of Maharshi Dayanand University, Rohtak, we have classified into two experimental groups and two control groups @ 200 participants in each group.



The Inclusion Criteria (non-yoga practitioner, age) and the Exclusion Criteria (rare disease, EI training) . This process results into 10 groups. After stratification, 386 males and equal number of females were selected in the age group from 18 to 40 years. As shown in the above diagram,



there are two intervention groups and two control group containing equal number of participants. In control groups, we used pre-post and post designs. The difference is taken by the post-post as per diagram. Similarly, experimental interventions are given as per design shown in the line diagram. Emotional Intelligence for college students were assessed with the help of the Multi-Measure of Emotional Intelligence (MMEI) 80 Item Scale. To retain all 5 sub-domains of MMEI the Item scale was used to assess Emotional Intelligence for students. The study was conducted at Maharishi Dayanand University, Rohtak (Haryana). Solomon 4 groups design and t-tests were used using the SPSS version 25.

Results discusses about the results and findings. Table 4.4 contains the EI in total and group wise for groups 1- 4. Tables 4.5, 4.7, 4.9, 4.11 and 4.13 contain the initial and final mean difference among Experimental group (EG) 1- Control group (CG) 2 and EG3-CG4 of all five components of EI. Tables 4.6, 4.8, 4.10, 4.12 and 4.14 show both the independent and paired t-tests results for all five components. Similarly, Figure 4.15 depicts combined results before and after test. As per results t-value is significant at $p=0.001$.

The next chapter discussion is about the discussion of the results. To relate our study findings, randomly we selected $n=10$ in the yoga group and $n= 10$ from control group. In Chu's studies with (S.D=8.38) yoga it was significant ($p=0.01$) and in our case (S.D=19.45) greater significance ($p=0.001$).

Conclusion gives the conclusion of the work carried out in the thesis. From the present study, the conclusion is that, yogic practices have an edge in improving E.I and contributes the information about role of yoga practices in improving various functional areas of college students.

Keywords: Emotional Intelligence; College Students; Mental Health; Statistical tests; Yoga; Meditation.


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