

EVALUATING THE IMMEDIATE AUTONOMIC AND PSYCHOLOGICAL RESPONSE TO DIRGA PRANAYAMA IN WORKING PROFESSIONALS

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Abstract - Pranayama, an ancient yogic practice, has been shown to modulate autonomic nervous system activity by enhancing parasympathetic dominance and reducing sympathetic over-activity. This study focuses on Dirga pranayama (three-part breathing), a slow and controlled breathing technique, involving sequential expansion of abdomen, thorax and clavicular region. In the present study, we aimed to evaluate the immediate effect of Dirga pranayama in autonomic and psychological aspects in working adults. A pilot study was conducted among six working professionals aged 25-45 years where Dirga pranayama was given for 15 minutes, Physiological parameters like blood pressure, pulse rate, peripheral oxygen saturation, respiratory rate, peak expiratory flow rate and Psychological parameters like STAI and SLCT were assessed and base line and post results were interrupted. The findings indicated no significant improvement in autonomic function except PEFR and in psychological assessment, mild anxiety was reduced no change in cognition. This study concludes that that Dirga pranayama is a cost effective tool, but no significant changes in cardiac function, but there is a mild improvement in pulmonary function and it mildly reduces anxiety, no improvement in cognition.

Key Words: Dirga pranayama, Three-part breathing, Parasympathetic dominance, Sympathetic over-activity, Cardiovascular, Pulmonary

1. INTRODUCTION

Pranayama is a practice of voluntary breath control, consisting of conscious inhalation and exhalation, is often practiced in conjunction with dhyana and asanas [1]. Pranayama consist of three phases puraka (inhalation), kumbhaka (retention), and rechaka (exhalation) that can be either be fast or slow [2]. Pranayama is known to improve pulmonary function [3] and cardiovascular profile [2,4,5] and reduce the risk factors of cardiovascular diseases [6]. Pranayama also shown to be beneficial in treatment of physiological and psychological diseases, involving stress [7].

Dirga pranayama is also a type of pranayama which is similar to yogic breathing and sectional breathing but differs in procedure. Dirga pranayama is three-part breathing or mahat yoga pranayama [8] or complete breathing. Dirga pranayama is a slow and controlled breathing technique which involves three parts of torso—lower belly, ribcage, and upper chest. It promotes deep relaxation, enhances oxygenation, and helps in releasing tension and stress [9]. Dirga pranayama comprises abdominal breathing, diaphragmatic breathing and clavicular breathing [10]. Like any other [11] pranayama Dirga pranayama, can also be used in improve respiratory function and improving mental health.

The current world is competitive and for sustaining work related stress and pressure is common and the working professionals expose to high stressors and time pressure [12]. Practicing pranayama helps to increase parasympathetic dominance and decrease sympathetic over activity. Although pranayama practices such as nadishodhana, bhramari, sheetali, sheetkari have been extensively studied, Dirga pranayama is a corner stone of scientific evidence, highlighting a clear need for further investigation. This study is particularly about the immediate effect of Dirga pranayama in adults, particularly focused on the parameters linked with cardio-pulmonary functions and psychological parameters

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1.1 Objectives of the study

The primary objective of the study is to evaluate the immediate effect of practicing Dirga pranayama for 15 minutes on autonomic and psychological parameters in working adults aged 25-45 years. Parameters such as blood pressure, pulse rate, peripheral oxygen saturation, respiratory rate, peak expiratory flow rate, State-Trait Anxiety Inventory (STAI) and Six-Letter Cancellation Test (SLCT) was assessed.

2. METHODOLOGY

2.1 Study design

This was a single-group pilot study in which measurements was recorded before and immediately after the intervention. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. All participants were clearly informed about the purpose and procedures of the study, and written informed consent was obtained before their participation.

2.2 Participants

A total of six volunteers aged between 25-45 years were recruited for the study. The participants were working in the professional settings and were exposed to occupational stress. Participants were selected using on convenience sampling. Individuals with any known cardiovascular, respiratory, neurological, or any other who are having systemic illness were excluded from the study. Written informed consent was obtained from all participants prior to data collection.

2.3 Intervention

This breathing technique is practiced for 15 minutes instructed by a naturopathic and yogic practitioner. The environment where the practice held was well ventilated and quiet, the practice was done between the 10am to 12:30 pm. Participants were asked to lay down in shavasana (corpse pose), eyes closed. After brief relaxation for 1-2 minutes by focusing on the respiration the practice of Dirga pranayama begins. Dirga pranayama is divided into three phases; *Phase 1* - Abdominal breathing- the participants is asked to inhale deeply and slowly expand the abdomen then while exhaling the participants are asked to exhale completely as if the navel touches the spine, this is done for 5 times. *Phase 2* - Abdominal breathing with diaphragmatic breathing- the participants is now asked inhale deeply and fill the abdomen first followed by expanding the thorax and exhale completely, first thorax and then abdomen, this step is repeated for 5 times. *Phase 3* - Abdominal breathing, Diaphragmatic breathing and Clavicular breathing- now the participant is asked inhale deeply and expand the abdomen first followed by thorax and upper part of the chest (clavicular breathing) and exhale in the opposite direction first clavicle then thorax and finally abdomen. This is one cycle and the participants were instructed to follow the procedure for 5 times. Throughout the procedure, the participants were instructed to perform a slow and controlled pace of breath approximately 5-6 breath

2.4 Outcome Measures

2.4.1 Physiological Parameters:

Physiological parameters were measured before and immediately after the pranayama practice. The following parameters were assessed Blood Pressure (BP) — systolic (SBP) and diastolic (DBP) measured using a validated sphygmomanometer after five minutes of seated rest, Pulse Rate (PR) — simultaneously recorded via the pulse oximeter, Respiratory rate (RR) was measured by counting chest excursions over one full minute, Peripheral Oxygen Saturation (SpO₂) recorded using a digital pulse oximeter AccuSure YK011 Fingertip pulse oximeter, and Peak expiratory flow rate is measured using peak flow meter.

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2.4.2 Psychological Parameters:

Two validated psychological tool were used State-Trait Anxiety Inventory (STAI) — a widely used 20-item self-report questionnaire that separately measures state anxiety (situational) and trait anxiety (dispositional), with higher scores indicating greater anxiety and Six Letter Cancellation Test (SLCT) — a neuropsychological test assessing selective attention, processing speed, and cognitive flexibility, commonly used as an objective marker of stress-related cognitive function.

2.5 Statistical Analysis:

All baseline and post data were collected, the statistical analysis were conducted using statistical software, JASP version 0.95.4.0. depending upon the distribution of data, appropriate test was conducted.

3. RESULT:

Descriptive statistics were conducted, all the data shows normal distribution, p value > 0.05 (Shapiro-Wilk) except SpO₂. The total no of participant was 6 where 4 of them were female and 2 were male, the mean age is 34.17 ±SD 6.2, mean BMI 28.13 ±SD 2.16, for the normal distribution of data the paired T-test was conducted for the non-normality data distribution Wilcoxon Signed Rank test were conducted. Their physiological parameters, Systolic blood pressure(p0.291) and diastolic blood pressure(p0.946) were unchanged, pulse rate shows no significant change(p0.489), respiratory rate shows slight reduction but no significant change((p0.317), peripheral oxygen saturation, peak expiratory flow rate shows sight change, but statistically there is no significant improvement, but the trend is towards significance(p0.089). The psychological assessments, STAI shows a notable change in anxiety reduction(p0.129) while SLCT has no significant change(p0.382).

Variable	Pre Mean	Post Mean	Change	Statistic	p-value	Test Used	Significance
SBP	119.3	123.3	+4.0 mmHg	t = -1.181	.291	Paired t-test	Not significant
DBP	80.67	81.00	+0.33 mmHg	t = -0.072	.946	Paired t-test	Not significant
Pulse Rate	72.50	74.33	+1.83 bpm	t = -0.747	.489	Paired t-test	Not significant
SpO ₂	98.50%	97.33%	-1.17%	W = 7.000, z = 0.730	.581	Wilcoxon Signed-Rank	Not significant
Respiratory Rate	17.83	17.00	-0.83 br/min	t = 1.112	.317	Paired t-test	Not significant
PEFR	257.5	290.8	+33.3 L/min	t = -2.111	.089	Paired t-test	Trend (p < .10)
STAI (Anxiety)	47.00	40.33	-6.67	t = 1.818	.129	Paired t-test	Trend (p < .15)
SLCT	54.83	52.34	-2.49	t = 0.957	.382	Paired t-test	Not significant

4. DISCUSSION:

The piolet study conducted, and the result shows that there is no improvement in autonomic parameters except PEFR and in psychological parameters, there is an improvement in STAI, but no significant changes were found in SLCT. This study is in accordance with recent literature supports the beneficial role of pranayama in autonomic and psychological

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regulation. Giridharan S et al. (2024) [13] concluded that pranayama improves stress levels, fatigue and quality of life in cancer patients. This study is in agreement with the supportive role of pranayama. Christian Mutze et al. (2025) [14] in their systematic review and meta-analysis concluded that pranayama significantly reduced the symptoms severity in individual with mental disorders. However, they also recommended large studies.

Moreover, Samiran Mondal (2024) [15] propose physiological mechanisms explaining that slow breathing practice through pranayama enhances vagal tone, regulates autonomic nervous system balance and affects higher centres of the brain responsible for emotional responses. Sharma et al. (2024) [16] found that pranayama along with meditation significantly reduced the level of stress, anxiety and depression score along with autonomic function. This present study is also limited due to its small sample size.

5. CONCLUSIONS

Thus, it may be concluded from the above study that Dirga Pranayama does not improve autonomic function and psychological response in working adults totally. The immediate effect only has mildly improved PEFr and mildly decreased anxiety, this may be due to its small sample size. It has been indicated that future studies can be carried out with a larger sample size or Randomized Control Test to obtain a significant result.

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