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Scientific Pranayama as a Tool for Observation of Cognition and Psycho-Behavioral Abilities in Young Adolescents

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Abstract - *Yoga and pranayama as third and fourth limbs of Astanga Yoga originated in ancient India and spread across the globe. The knowledge of pranayama is well practiced for physical, mental, psychological, spiritual and social well-being. Different types of Cognition, psycho-behavioral aspects and psychosomatic imbalance are serious concerns in young adolescents. Cognitive assessment seeking scales of young adolescents are assessed for implications of scientific pranayama. The scientific pranayama techniques with specific time duration of practice that influence mind and sympathetic and parasympathetic nervous system are suitably selected for the study. Scientifically designed pranayama techniques- A. Anuloma-Viloma, B. Bhramari and C. Meditation are selected for the implication on cognition and psycho-behavioral aspects. Two age groups A. Young adults of age group 19-23 years and B. Adolescents of age group 14-18 years are selected for the study. Detailed questionnaire related to cognitive aspects analyzed and assessed for Forgetfulness, Distractibility and False Triggering qualities are distributed for analysis in the selected age groups. The present research paper deals with the very interesting observations of research on the impact of three types of pranayama on selected age groups and analysis for implications before and after practice of pranayama may be a suitable tool for attending cognition and psychological behavioral abilities and the set techniques can be used as a tool for alternative therapeutic directions in medical and neurological sciences.*

Key Words: **Anuloma-viloma, Ashtanga yoga, Bhramari, Cognition, Meditation, Pranayama, Psycho-behavioral abilities, Psychometric tests.**

1. INTRODUCTION

Yoga is a very ancient knowledge of India and spread across the world. In recent time, especially post Covid-19 era, yoga has been significantly followed by the human kind across globe. The fourth limb of Astanga yoga, pranayama popularly used as a therapeutic support for many ailments. Regular practice of pranayama with scientific approach sharpens one's intellect, discipline, personality, character, emotional balance, mental and social well-being. Considerable research is being carried out by several practitioners, trainers, scientists and spiritual Gurus worldwide. The data on pranayama developed through observation, research and suitable conclusions drawn are being published and well documented in scientific community. The modern research on yogic sciences is brought to the forefront through the involvement of media, discussions, conferences, lectures, practical sessions and articles published in newspapers and exclusive journals on the subject [1].

1.1 Yoga Pranayama and Scientific Pranayama

Yoga-pranayama practices have proved as an alternative remedy for day-to-day stress, situational tension, chronic anxiety and deep depression. People of all age groups search various medical solutions for ailments and alternatively find convincing solution with some sort of yogic practices, as yoga-pranayama finds stability of mind, health, enhances physical and mental fitness impacting breath, body, emotions and thoughts [2]. Scientific Pranayama deals with organized and systematized practice of breathing (with puraka-inhalation, kumbaka–holding the breath and rechaka-exhalation) where prana through vayu moves in different directions (prana, udana, samana, apana and vyana) in the body impacting different organs and physiological systems- lungs, brain, digestive, blood circulation and excretion in general [3]. Parallel to yoga-asanas, Pranayama though ancient practice, in recent time, occupied the pride of place among yogic procedures and pronounced as potent

technique of breathing after Covid-19 hit the world a few years ago. The trained and many practitioners are being benefitted by the yoga-pranayama, meditation for steadiness, calmness and mindfulness [4, 5].

The practices proved to be impacting mind and nervous system as well as improving consciousness to lead mindful and meaningful life. Pranayama with scientific approach and practice has been included as a supportive therapy in most of the corporate hospitals for holistic health improvement and well-being. Experimentation, observation, analysis and conclusion of time duration of practice during Puraka (inhalation), Kumbhaka (breath retention) and Recaka (exhalation) are the three basic requirements involved in breath regulation in scientific pranayama, where the practitioner focuses for desired benefits that impact body organs, mind and physiological functions.

1.2 Cognition and Psycho-behavioural Aspects

In humans, mood, situation, stress, depression and anxiety are unpredictable. Based on the situations, human behavior is the potential ability of an individual at mental, physical and social levels. The behaviour aspects include - Sensation seeking, Disinhibition, Boredom susceptibility, Experience seeking and Thrill and Adventure seeking, anger and social behaviour. Behavior is caused by genetic and environmental determinants and situations along with several activities influence an individual in day-to-day life, also motivated by thoughts and emotions which reveal things about the individual's psyche such as attitudes and values, anxiety, depression and situations of stress tremendously influence human beings [6, 7].

Scientific research related to pranayama and application of various types of pranayama on human brain. In recent time, research of yoga and pranayama in medical field and their impact on various systems has led to establish very crucial role of pranayama on mind, nervous system and psychiatric disorders [8, 9, 10, 11, 12, 13].

The present paper is the outcome of research carried out by the first author of this paper, for the award of Ph. D degree in yoga and pranayama – yogic sciences. The original data and findings are mentioned as outcome of the research.

2. MATERIALS AND METHODS

The exhaustive study of literature, analysis of data and discussions with scientific fraternity, medical doctors, scientists, psychologists and yoga gurus is the base for the design of experiments. Anuloma-Viloma, Bhramari, Pranava / meditation are identified for the present research study. Identification and selection of adolescent groups – (boys and girls) 14-18 yrs and young adults – (males and females) 19-23 yrs. Consent from parents of participant groups for research and experimentation.

2.1 Experimentation Techniques

Identification of groups with problems of cognition and psycho-behavioural aspects- Attention, comprehension, memory (short term and long term), Fear, Depression, Anxiety, Stress, low self-confidece. Conduction of lectures and practical classes (offline and online mode) were conducted on techniques of pranayama-Anuloma-viloma, Bhramari and Pranava/Meditation. Questionnaire and feedback analysed. 30-35 participants in one group and 20 participants in another group are subjected to the impact of pranayama techniques.
The following parameters are enquired for identifying the participants of two different age groups. Students of age group 14-18 Yrs (young adolescents to attaining the age of 18 Yrs.- studying 10th Class and 1st and 2nd Pre University Programs) selected with questions and general discussion on their interests, studies, general health issues, anxiety, depression, psychological fear/fear of examinations, memory related issues, behavioural issues with classmates and siblings/parents. Identified boys and girls of the age groups (group – 1) and (group - 2) selected are from middle/upper middleclass groups, parents with a routine of work at home and regular day to day activities, into teaching assignment and research, a few of the parents of the participants are from agriculture back ground, formers, working in private sectors and also in small scale businesses. All the participants were advised not to consume alcohol, intoxicants, drugs, smoking during the practice of pranayama techniques, and to have clean and neat habits and consume only satwik food (soft food which can be easily digested under normal

conditions).

2.2 Procedures - General

Required proformas and consent forms were made to be filled by the participants, prior to the conduction of practical sessions - the scientific pranayama techniques of Anuloma-viloma, Bhramari and Pranava/Meditation as per the prescribed guidelines (5). The prescribed plan of action and practice-Anuloma-Viloma pranayama – for 10 minutes, Bhramari pranayama – for 10 times (each time with 10 to 13 secs duration with humming bee sound) followed by meditation– for 10 minutes.

2.3 Procedures - Experimental

Cognitive Assessment Questionnaire Assessment format described by Broadbent et. al. 1982 [14]- with conclusions based on the score as given in terms of - Very often, Quite often, Occasionally, Very rarely, Never). Compared with the control and psychometric questionnaire after completion of practice of pranayama techniques, after 15 days. All the participants were made to fill three proforma sheets - Participant Information Sheet, Consent form and Social demographic data sheet.

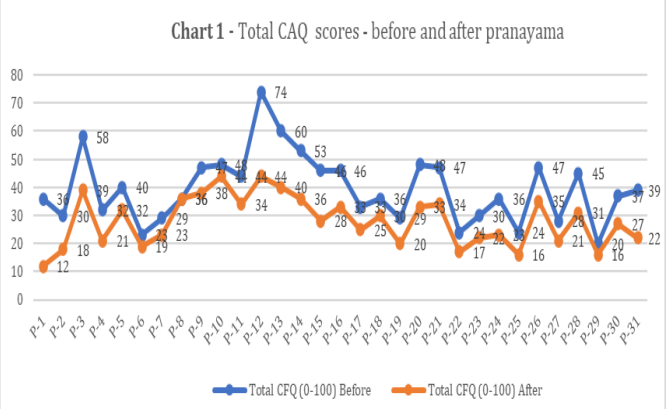
2.4 Cognitive Assessment Questionnaire

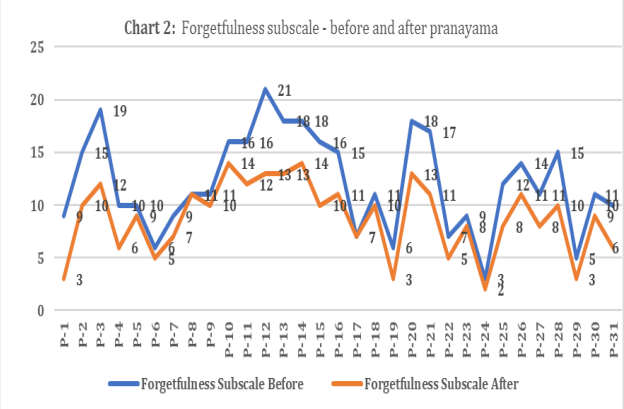
A proforma of 25 questions related to cognitive assessment were prepared and circulated to the participants of both the age groups. Three cognitive abilities were assessed in the participants of two different age groups- **Forgetfulness** (Items 1, 2, 5, 7, 17, 20, 22, 23 of questionnaire) – "a tendency to let go from one's mind, planned- names, intentions, appointments and words", **Distractibility** (Items 8, 9,10, 11, 14, 19, 21 ad 25) – "social situations or interactions, absentminded or easily disturbed in one's focused attention", **False Triggering** (Items 2, 3, 5, 6, 12, 18, 23 and 24) "interrupted process of sequences of cognitive and motor actions- nerve related".

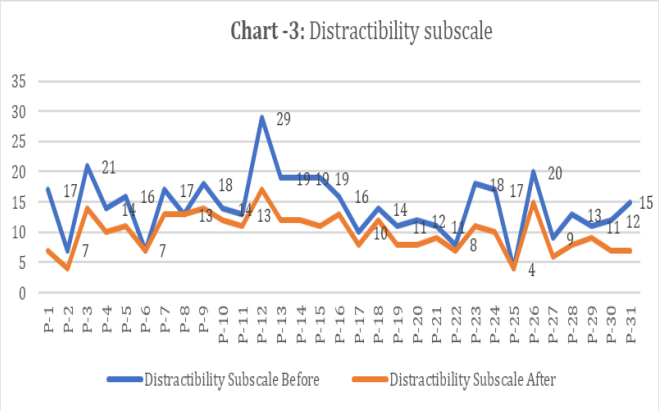
3. RESULTS AND DISCUSSION

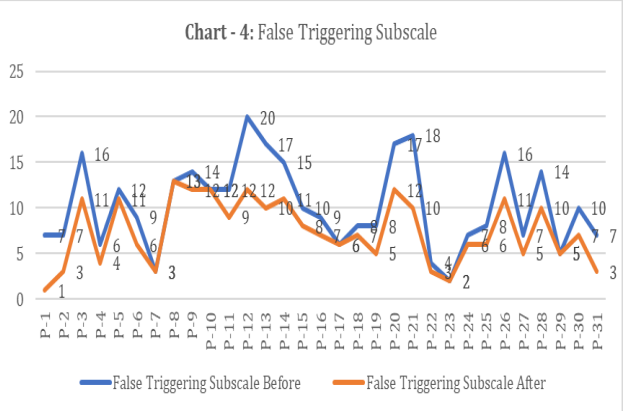
3.1 Results – Age group 1 (19 to 23 Yrs.)

The participants of age group (19 to 23 Yrs.) of 31 individually enquired through proforma with questions and taken as 'control', before practice and after practice for 15 days with specific procedures. The data shows the overall psychometric assessment of the participants. The 25 questions of cognitive assessment questionnaire are for assessing three cognitive related qualities A. Forgetfulness sub-scale, B. Distractibility sub-scale, C. False triggering sub-scale. The questionnaire proforma was developed for assessing cognitive failures that occur in human being in day-to-day such as absent-mindedness, slips, errors of perception and motor functions (reactions purely brain and nerve related functions). Chart 1-4 represent total scores (Chart 1) of the participants, for forgetfulness (Chart 2), distractibility (Chart 3) and False triggering (Chart 4) in the age group of 19-23 yrs., before and after the practice pranayama techniques.









3.2 Results - Age Group – 2 (14-18 Yrs)

Similar kind of procedures as mentioned above or the (age group of -19-23 yrs.) are followed for control group of age 14-18 yrs as mentioned for age group - and all the proformas and the same conditions are followed. The tables and charts are beyond the scope of this research paper. Similar kind of observations for cognitive assessment of forgetfulness, distractibility and false triggering for the participants of the age group 14-18 yrs.

Comparatively the participants of age group 19-23 yrs had better under-standing of the principles scientific approach of all the three pranayama techniques – Anuloma-Viloma, Bhramari and Meditation [15].

A new science that deals with the ability of brain to reorganize and form new neural connections. Critical experimental work demonstrated increased grey matter volume and density in several critical brain regions, compared to non-practitioners. The reported structural changes occur in the insular cortex which serve as the source of brain for interoceptive awareness—the ability to sense internal bodily states [16, 17].

Continuous practice of Pranayama exerts powerful effects on the autonomic nervous system, shifting the balance from sympathetic (fight or flight) to parasympathetic (rest and digest) systems. This shift occurs through multiple pathways [18]. In the present study also the remarkable and visible change after practice of pranayama the participants of both age groups expressed change forgetfulness, distractibility and false triggering abilities.

4. CONCLUSIONS

Cognitive and psycho-behavioural abilities studied on forgetfulness, distractibility and false triggering of two age groups has proved that Anuloma-viloma, Bhramari and Meditation pranayama has impact on mind and thinking. The practice has influenced at physiological and biochemical levels of functional aspects of brain, impacting cortex, right and left brain, as Anuloma-Viloma, Bhramari and Meditation could bring considerable change in both the age groups.
As it is mentioned in the discussion with supporting reference, Anuloma-Viloma works on the principle of psychology-breathing and emotions, along with other principles operating naturally in the lungs and other areas of body and mind.
Several reports also confirm similar results related to the impact of Anuloma-Viloma and present observations and results of participants coincide with the observations in the published research papers on impact of the technique. The last 10 mns practice of Meditation certainly impacted on calming down of mind. The technique has illuminating, soothing and permanent impact on the participants.
Systematic daily practice of pranayama at a set particular time, without interruptions, produces clear benefits. Sharing emotions with friends and the trainer and using visualization and breath techniques (e.g., Anuloma–Viloma) helps release emotions and deepens understanding of the process. Regular, observed practice (30–45 minutes daily, ideally lifelong) combined with knowledge of physiology and biochemical reactions in human body increases therapeutic impact, promoting oxygenation, detoxification, and cellular rejuvenation. Forceful, conscious breathing generates specific vibrations—audible

(Bhramari) or silent (Anuloma–Viloma, Pranava)—that influence body and mind and support meditation-wellness. Timing and technique lead to calmness, improved concentration, memory, reduced anxiety and depression, greater confidence and overall psychological and social well-being. The applied scientific pranayama techniques are useful for enhancing cognitive and psycho-behavioral abilities in adolescents and young adults.

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