

## Comparison of Three Physically Active Groups on Perceived Stress during Covid-19 Lockdown

**Dr. Vikram Singh,**

Assistant Director, Physical Education, Sports office, Jawaharlal Nehru University, New Delhi, India, e-mail – [karanptk88@gmail.com](mailto:karanptk88@gmail.com)

**Dr. Navdeep Joshi,**

Assistant Professor (Yoga), Yoga Science Department, SLBSNSU, New Delhi, e-mail = [navyoga.yoga@gmail.com](mailto:navyoga.yoga@gmail.com)

**Dr. Surender Singh,**

Assitant Professor, PE, KMV, University of Delhi, [surenderkmv@gmail.com](mailto:surenderkmv@gmail.com)

**Dr. Parmod Kumar Sethi,**

Associate Professor, Physical Education, PGDAV College (E), University of Delhi, India, e-mail: [sethiparmod@rediffmail.com](mailto:sethiparmod@rediffmail.com)

### Abstract

People adopt their own favorite activities in order to cope with stress and emotions. Choice of physical activity depends upon several factors like availability, socio-economic status, individual differences etc. The present study aims to evaluate the effect of activity type on perceived stress among a sample of subjects going through a transition period from unemployment to work during Covid-19 lockdown period. 96 participants, all males in the age group of 30 to 36 years (Mean age  $32.82 \pm 1.91$ ) were enrolled in this randomized controlled study (RCT), voluntarily. The three types of activity interventions, asana group (45 minutes-3 weeks), aerobics group (45 –minutes-3 weeks) and pranayama meditation (45 minutes-3 weeks) were compared on perceived stress score (PSS) to find out the impact of activity on their PSS scores. The non-parametric test, Kruskal-Wallis test provided very strong evidence of a difference ( $p < 0.05$ ) between the mean ranks of at least one pair of groups. Dunn's pair wise tests gave a strong evidence ( $p < 0.05$ ) of a difference between the group who practiced pranayama meditation and the group which did only the asana. No significant differences in mean ranks of asana and aerobics group, and the aerobics and pranayama meditation groups. Post pranayama meditation group displayed the lowest percentage of participants who fell in the low perceived stress range.

**Keywords:** perceived stress scale, type of activity, aerobics, asana, meditation

### I. Introduction:

Yoga is an ancient science that includes asanas, breathing techniques and meditation as its integral components. Many research studies have reported beneficial effects of aerobics and yoga on psychological as well as physiological functions [1], [9], [10], [11]. Everyone faces a lot of competition at various stages of life which is one of the many reasons behind for stress-related metabolic disorder. Yoga and various other methods of staying fit are good remedies for alleviating stress and the cost-effective methods like yoga and meditation help to deal with stress and stress-related disorders to a great extent [4]. There are very limited studies that compare the 3 powerful methods (aerobics, asana, pranayama meditation) of stress management on perceived stress score. Hence, in the present study was being designed for 3 weeks training to 96 males from across India who enrolled voluntarily for only one out of the 3 choices of training as mentioned above. Much of literature on fitness and health focuses on the

impact exercise and yoga has on patients and their mood disorders, such as anxiety and depression<sup>[5]</sup>. The present study is an effort to fill these gaps in research studies about the level of stress an individual reports after practicing yoga or another form of exercise. There are several different forms of yoga being practiced and promoted by various yoga schools having minor ideological differences regarding the approach but the ultimate aim is same. The standard principles and contents of yoga are based on the ancient teachings, which include specific body postures (asanas), breathing techniques (pranayamas), and meditation (dhyana)<sup>[3]</sup>. The basic characteristics of all these yogic and aerobic fitness practices are more or less the same with some having greater to physical aspects on the other hand the practice like meditation tend to focus on purification of mind and thoughts as the priority approach to achieving excellence and well being.

## **II. Procedure:**

Objective of this study was to see whether there are differences amongst the three types of training intervention groups (independent ordinal variables) on perceived stress scores using Perceived Stress Scale (PSS). The PSS variable is a score derived from responses to 10 items Likert scale on the magnitude of perceived stress (dependent variable).

This randomized controlled trial study was being carried out all over India with the total sample size of 96 using convenient sampling method. Inclusion Criteria was as follows:

- Healthy males only (without any co-morbidities)
- Age between 30 to 36 years (Mean age  $32.82 \pm 1.91$ )
- Normal body weight and height ratio

Exclusion Criteria was as follows:

- Subjects with Locomotor & Musculoskeletal disability
- History of Cardiovascular disorder
- History of Respiratory disorders
- History of Diabetes mellitus, Hypertension
- History of Major surgery in the recent past
- History of Drug intake
- History of Alcohol & Smoking

Perceived stress scale (PSS-10) by Cohen S, Kamarck T, Mermelstein R. (1983)<sup>[2]</sup> was being used as tool to collect post 3 weeks training of 45 minutes all days except on Sunday's as follows:

Group-1: Asana (total duration- 45 minutes with 10 seconds rest in between each posture. Warm up, standing postures – tadasana, tiryak tadasana, katichakra asana, yog mudra, sputa vajrasana, vakrasana, bhujangasana, chakrasana, makarasana, naukasana, pawan muktasana, shavasana (1 repetition each posture)

Group-2: Aerobics: 45 minutes low impact-15 minutes-high impact-15 minutes, cooling down-15 minutes (45 minutes total)

Group-3: Pranayama-meditation: “Kapalbhati kriya-Bhastrika-Anulom-vilom (10 minutes)” Yog Nidra (35 minutes)- as per Bihar School of Yoga protocol (Total=45 minutes)

The responses were collected by preparing the online google form of Perceived Stress Scale (PSS-10) and circulating it throughout India using social media because of covid-19 lockdown. Internal consistency reliability of the total perceived stress scale (PSS-10) scores by Cohen S, Kamarck T, Mermelstein R. (1983) was good ( $\alpha = .714$ ) that supports the use of the PSS-10 among Indian population. Individual scores on the PSS can range from 0 to 40 with higher scores indicating higher perceived stress.

- Scores ranging from 0-13 would be considered low stress.
- Scores ranging from 14-26 would be considered moderate stress.
- Scores ranging from 27-40 would be considered high perceived stress.

Hypothesis: Null ( $\mu_0$ )

1. The post intervention perceived stress scores will have normal distribution across all the 3 groups.
2. There will not be significant differences between the 3 groups on perceived stress scores.

### III. Results and Discussion

The data did not adhere to normality assumption, so non parametric test i.e. the Kruskal- Wallis test, which is the non-parametric equivalent to one-way ANOVA, was being used for comparing the mean rank of three different groups in the present experiment because neither of the dependent and independent variables was normally distributed.

**Table-1: Descriptive statistics showing mean and standard deviation of all subjects (N=96).**

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
Pre training PSS scores	96	29.47	4.56	20.00	38.00	25.00	30.00	33.00
Post training PSS scores	96	15.66	6.80	5.00	31.00	10.00	12.50	23.50

Table-1 shows that the pre training perceived stress score (PSS) for all the three groups was higher ( $29.47 \pm 4.56$ ) and after training it decreased to  $15.66 \pm 6.80$ . the minimum and maximum values and percentile scores are being displayed.

**Table-2: Kruskal-Wallis Test**

Ranks			
	Type of activity	N	Mean Rank
Pre training PSS scores	Asana	32	41.66
	Aerobics	35	52.63
	Pranayama Meditation	29	51.07
	Total	96	
Post training PSS scores	Asana	32	58.97
	Aerobics	35	47.96
	Pranayama Meditation	29	37.60
	Total	96	

Table-2 shows Kruskal-Wallis Test displaying mean rank scores of the training methods on PSS before and after training.

	Pre training PSS scores	Post training PSS scores
Kruskal-Wallis H	2.969	9.038
df	2	2
Asymp. Sig.	.227	.011
a. Kruskal Wallis Test		
b. Grouping Variable: Type of activity		

Table-3 shows the test statistics calculated by Kruskal-Wallis H test in which it was observed that there was a statistically significant difference was observed in perceived stress score between the three different groups,  $\chi^2(2) = 9.038, p = 0.011$  ( $p < .05$  level of significance), with a mean rank PSS score (post 3 weeks training) of 58.97 for Asana group, 47.96 for aerobics group and 37.60 for pranayama-meditation group. The pre-training PSS scores were not found to be statistically significant between the three groups,  $\chi^2(2) = 2.969, p = 0.227$  ( $p > .05$  level of significance), with a mean rank PSS score (before the beginning of 3 weeks respective group training) of 41.66 for Asana group, 52.63 for aerobics group and 51.07 for pranayama-meditation group.

**Table-4: Hypothesis test summary using Kruskal-Wallis Test**

Null Hypothesis	Test	Sig.	Decision
The distribution of post training PSS scores is the same across categories of Type of activity.	Independent-Samples Kruskal-Wallis Test	.011	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

This 'Hypothesis Test Summary' box (table-4) is given for the for the Kruskal-Wallis test. As  $p < 0.05$ , there is very strong evidence to suggest a difference between at least one pair of groups.

Fig-1: Box plot showing Kruskal-Wallis test for independent samples

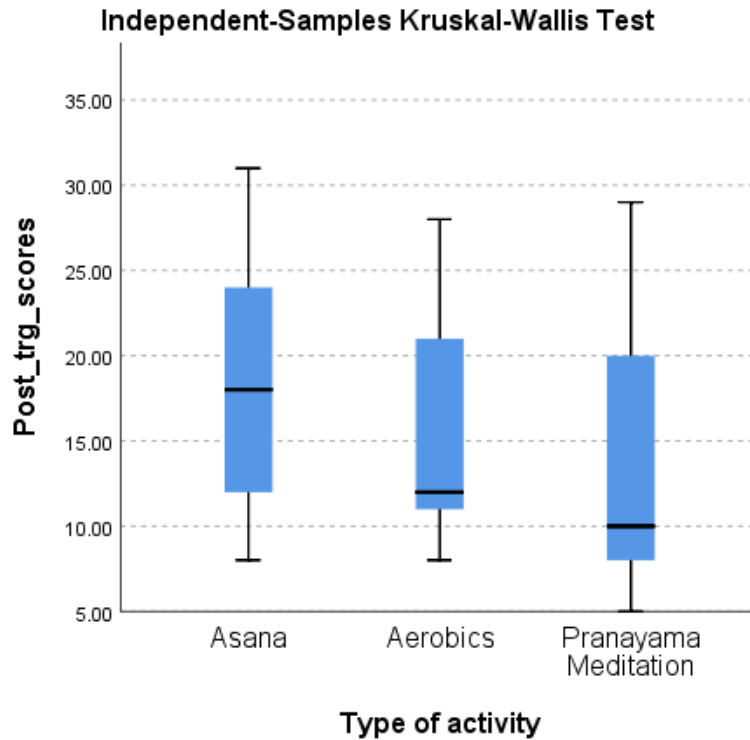


Figure-1 above shows that the pranayama meditation group had the lowest PSS scores after the 3 weeks training in comparison to the other two forms of training methods

Sample 1-Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj. Sig. <sup>a</sup>
Pranayama Meditation-Aerobics	10.354	6.969	1.486	.137	.412
Pranayama Meditation-Asana	21.365	7.115	3.003	.003	.008
Aerobics-Asana	11.012	6.788	1.622	.105	.314

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.

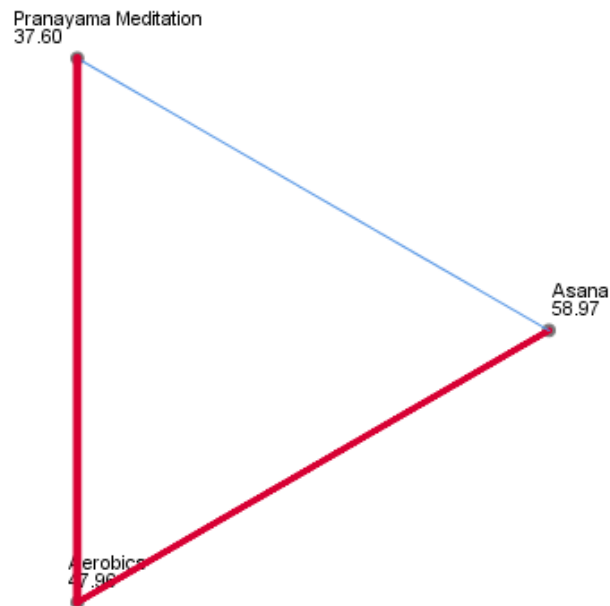
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

The pair wise comparisons table-5 shows the results of the Dunn-Bonferroni tests on each pair of groups.

Fig-2: Pair wise comparisons plot of type of activity intervention on perceived stress

### Pairwise Comparisons of Type of activity



Each node shows the sample average rank of Type of activity.

The Adj. Sig column in table-6 makes the adjustments for multiple testing (using the Bonferroni error correction). Only the p-value for the test comparing the pranayama and asana groups is significant ( $p < 0.05$ ). on the basis of above tables, it can therefore be said that the Kruskal-Wallis test provided very strong evidence of a difference ( $p < 0.05$ ) between the mean ranks of at least one pair of groups. Dunn's pair wise tests were carried out for the three pairs of groups. There was very strong evidence ( $p < 0.05$ , adjusted using the Bonferroni correction) of a difference between the group who practiced pranayama meditation and the groups which did only the asana. The median perceived stress score for the group that did pranayama meditation was 9 compared to 22 in the group that did asana only. There was no evidence of a difference between the other pairs.

The present study compared the effectiveness of three types of training viz. asana, aerobics and pranayama-meditation on self-reported perceived stress scores of male subjects through online programs for three weeks. This study found that males who practice pranayama – meditation had a significantly lower perceived stress level than the males who were engaged in asana only and aerobics only training sessions. The null hypothesis was rejected. This finding aligned with the previous studies that concluded that yoga was more effective at decreasing negative mood than other forms of exercises [7]. However, the findings of present research were not in conformity with the [5] study, which found that individuals who participate in yoga had higher levels of depression and lower levels of quality of life in comparison with the walking group. The difference in findings could be attributed to the different tools and sample population being studied and our study was done online with online training that too during Covid-19 lockdown. More comprehensive offline research comparing males and females and using a larger sample size would be beneficial to determine as to which type of activity influences the perceived stress in better ways. Netz and Lidor (2003) in their study demonstrated that low intensity activities like yoga asanas and some aerobic activities like swimming, can improve mood in comparison to the other forms of exercise. Thus, because this current study did not determine if certain types of exercise or yoga influence perceived stress level more research on this would be needed. The limited sample size and large variety of different

exercises and types of yoga performed impacted the potential correlation of perceived stress and type of activity.

#### **IV. Conclusion:**

There is a dearth of studies that compare individuals who practice yoga with individuals who perform other forms of exercise in the Indian context during pandemic lockdown. The research that is available is done offline and consists of comparatively small samples in the age group of 30 to 36 years. The current study contributes to the already available literature due to the fact that it explored self-reported perceived stress of males who practiced 3 different forms of training. This current research results show that the males who practice pranayama and meditation have a significantly lower perceived stress score than males who perform asana and aerobics, which contributes to the inconsistent literature, presented thus far. These findings could be used to help yoga teachers, coaches and mental health professionals to develop insight and plan better scientific and systematic training programs for their clients who struggle with stress.

#### **V. References:**

1. Balaji PA, Varne SR, Ali SS. (2012). Physiological Effects of Yogic Practices and Transcendental Meditation in Health and Disease. *North American Journal of Medical Sciences*, 4(10):442-8.
2. Cohen, S., Kamarck, T., & Mermelstein, R. (1983) . A global measure of perceived stress. *Journal of Health and Social Behavior*, 24(4), 385-396.
3. da Silva, T. L., Ravindran, L. N., & Ravindran, A. V. (2009) . Yoga in the treatment of mood and anxiety disorders: A review. *Asian Journal of Psychiatry*, 2(1), 6-16.
4. Hartfiel N, Burton C, Rycroft-Malone J, Clarke G, Havenhand J, Khalsa SB, et al. (2012). Yoga for reducing perceived stress and back pain at work. *Occupational Medicine*, 62(8):606.
5. Kraemer, J. M., & Marquez, D. X. (2009) . Psychosocial correlates and outcomes of yoga or walking among older adults. *Journal Of Psychology: Interdisciplinary And Applied*, 143(4), 390-404.
6. Netz, Y., & Lidor, R. (2003). Mood alterations in mindful versus aerobic exercise modes. *Journal of Psychology: Interdisciplinary and Applied*, 137(5), 405-419.
7. Rocha, K. F., Ribeiro, A. M., Rocha, K. F., Sousa, M. C., Albuquerque, F. S., Ribeiro, S. S., & Silva, R. H. (2012) . Improvement in physiological and psychological parameters after 6 months of yoga practice. *Consciousness And Cognition: An International Journal*, 21(2), 843-850.
8. Satyananda Saraswati, S. (2009). *Yoga Nidra* (4th ed.). Munger: Yoga Publ. Trust.
9. Sengupta P. (2012). Health Impacts of Yoga and Pranayama: A State-of-the-Art Review. *International Journal of Preventive Medicine*, 3(7):444-58.
10. Vijayalakshmi, P.Madanmohan,Bhavanani, A. B.Patil A, Babu, K. (2004). Modulation of stress induced by isometric handgrip test in hypertensive patients following yogic relaxation training, *IJPP*, 48:269-85
11. Woodyard C. (2011). Exploring the therapeutic effects of yoga and its ability to increase quality of life. *International Journal of Yoga*, 4(2):49-54.