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EFFECT OF SHORT AND LONG DURATION NADA YOGA MEDITATION ON HEART RATE OF PARA YOGA ATHLETES

Dakshata Tewani [1], Vikram Singh [2], Navdeep Joshi [3], Surender Singh [4]

[1] Former student of Bachelors Degree (Sociology Hons), Jesus and Mary College, Delhi University, New Delhi, India
[2] Assistant Director, PE, JNU, New Delhi, India
[3] Assistant Professor, Yoga, SLBSNSU, New Delhi, India
[4] Assistant Professor, PE, Keshav Mahavidyalaya, Delhi University, New Delhi, India

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Corresponding Author

Dakshata Tewani,
dakshatatewani@gmail.com

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ABSTRACT

Introduction: Heart rate is a fairly good indicator of health-related physical fitness and is often used by fitness and yoga trainers before, during, and after their training sessions. “Divyang Jana”, a term often used to refer to persons with disabilities (PwD) are equally and sometimes more prone to having elevated heart rates because of external and internal conditions beyond their control. This study was undertaken to evaluate the role of NADA Yoga Meditation (22 minutes) in improving the important physiological parameter heart rate (HR) in visually impaired (VI) para yoga athletes of Uttarakhand.
Method: 52 para-yoga athletes were divided into two groups of which one group did Meditation and the other did not. HR-1 (pre-intervention, HR-2- after one week, and HR-3 after 2 weeks of the intervention were measured in beats per minute offline (first week) and online (second week) NADA meditation training.
Result: At the end of the study significant decrease in HR-2 and HR-3 was seen in the para yoga sports persons who practiced Meditation as compared to the non-practicing group (control group) after controlling for the covariate HR-1 (pre-intervention heart rate).
Discussion: The results were interpreted using MANCOVA and concluded that NADA yoga meditation was effective in reducing the heart rate mediated anxiety levels of yoga para-athletes in just 2 weeks and was found to be effective not only in just a week but also after 2 weeks of NADA Yoga meditation training done for 22 minutes each. Further, it can be argued that NADA yoga meditation may modulate the physiological response to stress via neurohumoral activation as displayed by the fairly good indicator namely heart rate.

Keywords: NADA Yoga Meditation, Para Athletes, Heart Rate

1. INTRODUCTION

Yoga asana has been recognized as a sport in the recent past and not only has there been a rise of abled contenders, but also disabled people have started competing at various levels in competitions designed for them to perform and win. Sports training principles and philosophical aspects of yoga are combined to understand the outcomes of asana and pranayama practices besides other

important psycho-physiological variables like respiration rate and heart rate. These important and simple-to-measure tools assist athletes and coaches to gauge the intensity of training making it pertinent to therefore understand the metabolism amongst disabled people at different times of the day and its significant implications due to its link with sleep, health, stress, and fatigue, ultimately determining the rest and recovery for better performance not only in the competition but during the recovery and rest phases.

Yoga and meditation studies have proven to be extremely efficient in improving basal and resting heart rate, but this holds true mostly for the healthy population. It is important to know how yoga by being a way of life, characterized by balance, health, harmony, and bliss, Nagendra and Nagaratna (1977) Meditation as the seventh limb of Ashtanga yoga Taimini (1961) is the state of alert rest for all as stated by Maharshi Mahesh Yogi Yogi (1972). Mastering the skill of meditation sooner can lead to healing and improved concentration and for the Divyang Jans to stay focused on the task without worrying about their condition. Over a period of time, the super consciousness also called the Samadhi Wallace et al. (1971), Wallace and Benson (1972) can be achieved which in turn paves the way for changing the outlook from being a victim or a sufferer to being a divine personality. This feeling may not be making the "Divyang Jans" outperform others in other fields of expertise but can certainly play an important role in convincing "Divyang jans", their coaches, and parents to always be positive and progressive.

Studies conducted on heart health clearly show that daily meditation practice can improve blood circulation, lower the heart rate, and facilitate maintaining a healthy heart Charu and Nadayoga (2019). Nada Yoga finds a detailed mention in ancient Indian literature. Nada means vibration and Yoga means Union between the two subtle but powerful psychic and spiritual entities. Nada Yoga meditation is the technique of the union of the individual mind with cosmic consciousness through the flow of vibrations. Nadanusandhan is a technique of Nadopsana, which is aimed at attaining the acquaintance of ultimate truth in hatha yoga. The technique of Nada yoga was originally propounded by Guru Goraksnatha:

'proktam goraksanathenam nadopasanamucyate' Hathapradipika (n.d.) - IV/65) - Hathapradipika

and is reflected as the best of all the Layas (means of flow of mind) as mentioned by Sri Adinatha:

sri adinathena sapadakotilayaprakarah kathita jayanti / nadanusandhanakamekameva manyamahe mukhyatamam layanam// (Hathapradipika (n.d.)-IV/66, Hatharatnavali(n.d.)-IV/5, 15)

With this background, the present study was conducted to know if there is any effect of nada yoga meditation on the heart rate of Divyang Jana active sadhakas as compared to those in the non-practicing active group.

2. METHODOLOGY

This study was undertaken to analyze the effect of 22 minutes of NADA Yoga Meditation practice in improving the important physiological parameter heart rate (HR) amongst the visually impaired (VI) para yoga athletes of Uttarakhand state in India. 52 para yoga athletes were divided into two groups of which one group did Meditation and the other did not. HR-1 (pre-intervention, HR-2- after one week, and HR-3 after 2 weeks of the intervention were measured in beats per minute offline (first week) and online (second week) NADA meditation training.

Hypothesis

μ_0 = null hypothesis = There is no significant difference between the heart rates of control and experimental groups after 1 week and after 2 weeks, 22 minutes of NADA yoga meditation while controlling for pre (before the intervention is administered) intervention heart rate.

The objective of the study was to compare the adjusted mean scores of control and experimental groups by considering pre-intervention heart rate scores as covariates. A 22 minutes NADA Yoga meditation session was conducted for 2 weeks (one week offline and one week online) and the heart rates of para-yoga athletes were measured while controlling for the pre-intervention heart rate variable (HR-1). The researcher recruited 52 participants who were subsequently randomly divided into one of two groups, the experimental and the comparative match groups. There were 25 participants in the experimental group and 27 in the comparative match group. The heart rate for each participant was measured three times, pre-intervention, after 1 week and after 2 weeks.

It was expected that the heart rate will improve to a certain extent after 1 week but will certainly improve after 2 weeks. However, the researchers are aware that initial heart rate values have an important effect on post-intervention heart rate values. As such, the researcher wanted to control for differences in the pre-intervention heart rate values of participants. Pre-intervention heart rate and NADA yoga meditation training were the independent variables.

In SPSS Statistics, we created five variables: (a) the two continuous dependent variables, Heart rate-2, heart rate-3; (b) the categorical independent variable, group, which has two groups: "comparative match group", "experimental group"; and the covariate, HR-1 (pre-intervention heart rate). One-way MANCOVA was being carried out as a statistical measure to study the heart rate variables of the para yoga athletes.

3. RESULTS AND DISCUSSION

Table 1

Table 1 Descriptive statistics

Overall Descriptive Statistics			
	Mean	**Std. Deviation**	**N**
Age	20.2500	2.90284	52
HR1	68.9231	5.46234	52
HR2	66.4808	4.75061	52
HR3	63.0192	5.44308	52

Table 1 shows the mean and standard deviation scores of the basic demographic variable- age and heart rate measured values 3 times mentioned as HR-1 (pre-intervention), HR-2 (after one week), and HR-3 (after 2 weeks) of the intervention was being measured in beats per minute offline (first week) and online (second week) NADA meditation training.

The control group comprised of 25 para yoga athletes and the experimental group had 27 para yoga athletes.

Table 2

Table 2 Group wise Descriptive Statistics

	Group	Mean	Std. Deviation	N
HR2	Exptl	65.8400	4.45047	25
	Ctrl	67.0741	5.02246	27
	Total	66.4808	4.75061	52
HR3	Exptl	59.4400	3.39215	25
	Ctrl	66.3333	4.87537	27
	Total	63.0192	5.44308	52

Homogeneity of regression, linear relationship and homogeneity of variance was being pretested and found not being violated using Levene's test and scatter plots as below:

Table 3

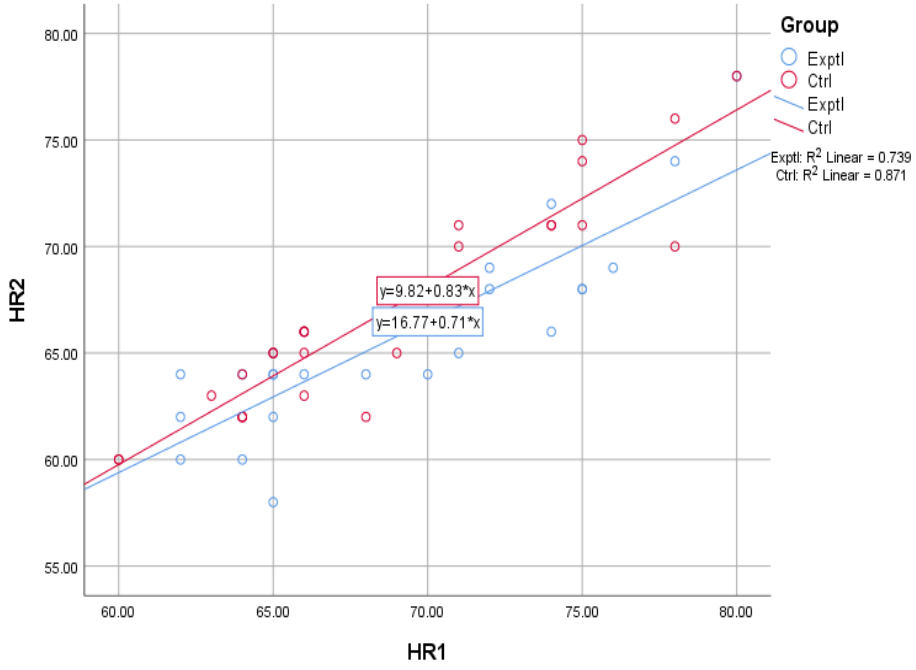
Table 3 Levene's Test of Equality of Error Variances[a]

	F	df1	df2	Sig.
HR2	3.029	1	50	.088
HR3	2.487	1	50	.121

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + HR1 + Group

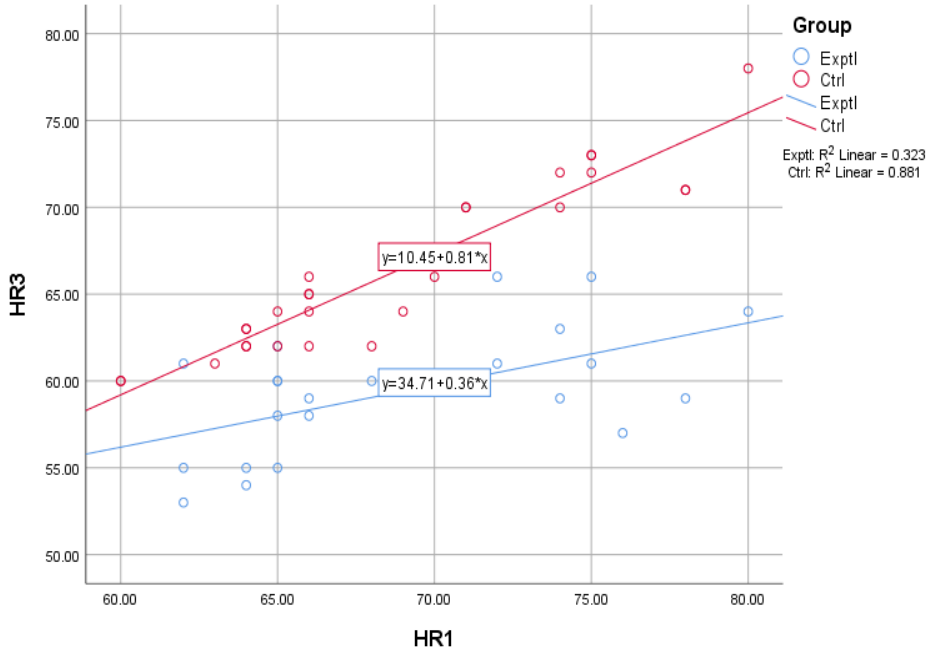
Graph 1



Graph 1 Homogeneity of linear relationship assumption

Homogeneity of linear relationship assumption between the covariate (HR-1) and the dependent variable (HR-2) is not being violated as seen in Graph 1

Graph 2



Graph 2 Homogeneity of linear relationship assumption

Homogeneity of linear relationship assumption between the covariate (HR-1) and the dependent variable (HR-3) is not being violated as seen in Graph 2

One-way MANCOVA in the present study was found to be statistically significant, this suggests that there is a statistically significant adjusted mean difference between the groups of the independent variable in terms of the combined dependent variable (after adjusting for the continuous covariate).

It would suggest that the combined mean scores of our dependent variables – HR-2 and HR-3– which have been adjusted for the continuous covariate, HR-1, differ between the two groups of our independent variable, group (i.e., the experimental and comparative match groups). Subsequent interpretation of the results from the one-way MANCOVA has been highlighted below:

Table 4

Table 4 Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.337	12.182[b]	2.000	48.000	.000	.337
	Wilks' Lambda	.663	12.182[b]	2.000	48.000	.000	.337
	Hotelling's Trace	.508	12.182[b]	2.000	48.000	.000	.337
	Roy's Largest Root	.508	12.182[b]	2.000	48.000	.000	.337
HR1	Pillai's Trace	.823	111.381[b]	2.000	48.000	.000	.823
	Wilks' Lambda	.177	111.381[b]	2.000	48.000	.000	.823

Group	Hotelling's Trace	4.641	111.381[b]	2.000	48.000	.000	.823
	Roy's Largest Root	4.641	111.381[b]	2.000	48.000	.000	.823
	Pillai's Trace	.659	46.421[b]	2.000	48.000	.000	.659
	Wilks' Lambda	.341	46.421[b]	2.000	48.000	.000	.659
	Hotelling's Trace	1.934	46.421[b]	2.000	48.000	.000	.659
	Roy's Largest Root	1.934	46.421[b]	2.000	48.000	.000	.659

a. Design: Intercept + HR1 + Group

b. Exact statistic

SPSS Statistics has also reported an **effect size** called **partial eta squared** (i.e., partial η^2). At present, there are no agreed upon definitions of what constitutes a strong (or otherwise) effect size Huberty and Olejnik (2006).

There are statistically significant differences in the experimental and comparative match groups in terms of the combined post-intervention heart rate variables, after controlling for the pre-intervention heart rate variables., F (2, 48) = 46.221, p < .001, Wilks' Λ = .341, partial η2 = .659.

Table 5

Table 5 Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	HR2	936.703[a]	2	468.352	107.100	.000	.814
	HR3	1172.413[b]	2	586.206	84.840	.000	.776
Intercept	HR2	53.173	1	53.173	12.159	.001	.199
	HR3	143.226	1	143.226	20.729	.000	.297
HR1	HR2	916.934	1	916.934	209.680	.000	.811
	HR3	555.592	1	555.592	80.409	.000	.621
Group	HR2	27.981	1	27.981	6.399	.015	.116
	HR3	649.442	1	649.442	93.992	.000	.657
Error	HR2	214.278	49	4.373			
	HR3	338.568	49	6.910			
Total	HR2	230975.000	52				
	HR3	208025.000	52				
Corrected Total	HR2	1150.981	51				
	HR3	1510.981	51				

a. R Squared = .814 (Adjusted R Squared = .806)

b. R Squared = .776 (Adjusted R Squared = .767)

Table 5 showing tests of between-subject effects indicates that there is a significant univariate outcome for heart rate measured after 1 week (HR-2) (F (1, 49) = 6.399, p = .015) and heart rate measured after 2 weeks, HR-3 (F (1, 49) = 93.992, p = .000) across group status. There was a further need to explore the source of the main effects across the groups, using post hoc analyses. The effect-size measure indicated that 11.6 percent of the total variance in HR-2 and 65.7 percent

of the total variance in HR-3 is explained by the independent variable (group) when removing the effect of HR-1 and interactions between them.

Table 6

Table 6 Estimated marginal means (adjusted mean scores of heart rates) after applying the covariates

Dependent Variable	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
HR2	Exptl	65.718[a]	.418	64.877	66.559
	Ctrl	67.187[a]	.403	66.378	67.996
HR3	Exptl	59.345[a]	.526	58.288	60.402
	Ctrl	66.421[a]	.506	65.404	67.438

a. Covariates appearing in the model are evaluated at the following values: HR1 = 68.9231.

Adjusted mean scores of heart rates (HR-2, HR-3) after applying the covariates table shows mean and standard error values of both experimental and comparative match groups on heart rate 2 and heart rate 3 dependant variables. The adjusted HR-2 mean score of experimental groups showed more decline in the heart rate from HR-2 (65.718) to HR-3 (59.345) as compared to the control group.

Upon pair-wise comparison of the experimental and comparative match groups, it was observed that there was a significant difference between the adjusted mean values of experimental and control groups on the heart rate variables (HR-2, HR-3) after controlling for the HR-1, i.e the initial value (P=.015) after 15 minutes and P=.000 after 25 minutes of NADA yoga intervention in the comparative match groups and experimental groups. Thus, the null hypothesis that there is no significant difference between the heart rates of control and experimental groups after 1 week and after 2 weeks of NADA yoga meditation while controlling for pre (before the intervention is administered) intervention heart rate stands rejected. Further, the adjusted mean heart rates of para-yoga athletes decreased significantly from 68.92 beats/minute to 65.71 b/m after 1 week and further lowered to 59.34 b/m after 2 weeks for the experimental group. Upon pairwise comparison, it was seen that the drop-in heart rate as a result of NADA yoga meditation session (22 minutes) for 2 weeks resulted in a significant decrease (p=0.015 and p=.000) in adjusted mean scores of heart rates. It can therefore be concluded that short duration (22 minutes) and short term (just 1 to 2 weeks) NADA yoga meditation was effective in reducing the heart rate- mediated anxiety levels of yoga para-athletes. In the study Peng et al. (2004) that was designed to quantify and compare the instantaneous heart rate dynamics and cardiopulmonary interactions during a sequential performance of three meditation protocols with different breathing patterns, it was found that different meditation techniques produce low-frequency heart rate oscillations.

CONFLICT OF INTERESTS

None.

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None.

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