Journal of Advance Research in Science and Social Science (JARSSC) **ISSN:** 2582-2004
Official Publication of Indian Mental Health & Research Centre Volume 06, Issue 02

DOI: 10.46523/jarssc.06.02.08
Multidisciplinary, Open Access
Impact Factor: 3.612

Impact of Proprioceptive Neuromuscular Facilitation Exercise cum Traditional Surya-Namaskar on Body Weight, Body Mass Index and Fat Percentage of College Level Players

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Abstract: "Yoga means union, an integration of oneself, and oneness with nature, all of creation and with the absolute. The very word Yoga defines the goal of life understood by the great Yogic sages of our country. The practice of the various system of yoga is the means by which the realization of union can be attained." There were total of eighty college level students of B.A. Physical Education and Sports, DAV (P.G) College, Lucknow, Associated college of University of Lucknow, Lucknow, randomly divided in to four groups, one control group and three experimental groups namely- Control group- 20 subjects, Traditional Suryanamaskar- 20 subjects (experimental group), Proprioceptive Neuromuscular Facilitation exercise group-20 subjects (experimental group) and Proprioceptive Neuromuscular Facilitation Exercise type Suryanamaskar consisting 20 subjects (experimental group). The age of the subjects was college going students of physical education and sports ranging from 17 – 28 years of age, who were also participating in competitive sports at different level of sports competition. The researcher has selected physical variables body weight, body mass index and fat percentage physiological variables to carry on this study. The selected physiological variables like Body Weight, BMI, Fat Percentage, BMR, were measured by stadiometer, weight machine, Body Composition Analyzer (BCA), instruments as per the guidelines of the User's Manuals. statistical techniques include the calculation of detailed descriptive statistics i.e. mean, standard

Received: 20.09.2022 **Accepted:** 14.10.2022 **Published**: 16.10.2023

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deviation, range, minimum and maximum of the raw scores. For the compression of the four groups, the analysis of covariance (ANCOVA) was also calculated. The appropriate statistical techniques with advice of experts were used and calculated with helps of Statistical Process in Social Sciences-20 (SPSS-20) software in the computer. The level of significance was set at 0.05. Descriptive statistical analyses like mean, SD, standard error, range were calculated on the selected physical variables of present study. The table no-1 revealed that there was significant difference observed among the four groups as calculated F (3, 75) = 3.34, P < .05. The calculated value was 0.024, which is significant at 0.05 level. The table no. 2 revealed as shown that the descriptive calculation as mean and SD for the four groups of Control, SN, PNF, & PNF SN were 14.47+ 3.02, 15.24 + 4.27, 14.93 + 3.99 and 12.04 + 2.88 respectively and the adjusted means were found to be 14.62, 14.26, 14.28, & 13.49 of the respective groups. The standard error for four groups was .17 and grand mean was 14.16. The table no-2 revealed that there was found significant difference among the four groups as calculated F (3, 75) = 7.97, (.000) at P < .01. The table no.3 revealed that the descriptive calculation as mean and SD for four group e.g. Control, SN, Proprioceptive Neuromuscular Facilitation Exercise & Proprioceptive Neuromuscular Facilitation Exercise SN groups were 19.61+ 1.51, 20.59+2.22, 20.07+3.13, & 21.65+1.83 respectively and adjusted mean were 19.47, 19.55, 23.39 & 19.51 of the respective groups. The standard errors for four groups were between .22 and .28 and grand mean was 20.48+2.34. The covariates appearing in the model are evaluated at the following values of pre adjusted BMI Mean of 19.377.

Keywords: Neuromuscular Facilitation Exercise cum traditional Surya-Namaskar

Introduction: **"**Yoga means union, an integration of oneself, and oneness with nature, all of creation and with the absolute. The very word Yoga defines the goal of life understood by the great Yogic sages of our country. The practice of the various system of yoga is the means by which the realization of union can be attained." **Suryanamaskar**- There is various references of commending the Sun with the end goal of good wellbeing and success, in Vedas. A portion of these Vedic prayers were fused into Nitya Vidhi (Daily required routine for a Human) for the

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prosperity of a person, through welcome to the Sun. These day-by-day methodologies were named as Suryanamaskar (actually interprets as "sun greetings"). Physical prostration to Sun, showing complete submission of oneself to God, is the main feature of these processes. The practices of Suryanamaskar adept vary from region to region. Suryanamaskar is an important part of yoga. It is a cycle of twelve asana performed with breathing. Suryanamaskar is an exercise, which could be very useful for athletes it stretches whole body parts of an individual. Referred to differently as Suryanamskar or Prostrations to Sun or Sun Salutation, the Suryanamaskar is extraordinary compared to other activities that individuals can perform. The advantages collecting from these activities are one of a kind and brilliant. This is a yoga-based exercise and it is standard to perform Suryanamaskar in the wake of performing releasing yoga works out. The Suryanamaskar is performed typically at a young hour toward the beginning of the day confronting the morning rising Sun. The Suryanamskar is done in 12 stages, each progression having its own particular stance (counting position and frame) with its own breathing example (inward breath or exhalation), and its own mantra. As mentioned earlier, one alternative to traditional static stretching is pro-prioceptive neuromuscular facilitation (PNF). Other techniques exist, but this research will focus on Proprioceptive Neuromuscular Facilitation Exercise stretching. When these stretches were being developed, the focus was to improve proprioception, range of motion, and motor control. Past research suggests that Proprioceptive Neuromuscular Facilitation Exercise shows slightly better, but not significant, gains in flexibility and ROM. Previous research presents conflicting information on improvements in strength, but many of the studies favour gains in strength. Looking at the history of research for both stretching techniques, many studies have been done on flexibility, ROM, peak torque, power, strength, etc. However, there are few studies that compare static stretching to Proprioceptive Neuromuscular Facilitation exercise. There is no study comparing yogic stretching hence it is the purpose of this research to look for any differences between yogic Suryanamaskar and Modified proprioceptive neuromuscular facilitation exercise type Suryanamaskar on various physical, physiological and psychological variables.

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Aim of The Study: The aim of study to examine the impact of conventional Suryanamaskar cum Proprioceptive Neuromuscular Facilitation Exercise type of exercises on selected physical, physiological and psychological.

Testing of Hypothesis: In this experimental study the null hypothesis was tested as- There will be no significance difference between Pre-test and post-test among the four groups- control group, Proprioceptive Neuromuscular Facilitation Exercise, traditional Suryanamaskar and modified Proprioceptive Neuromuscular Facilitation Exercise type Suryanamaskar.

Selection of Subject: Total of eighty college level students of physical education and sports, DAV (P.G.) College, Lucknow were selected randomly and divided in to four groups, one control group (A) and three experimental groups namely- (B) Conventional Suryanamaskar (C) Proprioceptive Neuromuscular Facilitation Exercise and (D). Modified Proprioceptive Neuromuscular Facilitation Exercise Type Suryanamaskar.

Methodology and procedure:

Sample: There were total of eighty college level students of B.A. Physical Education and Sports, DAV (P.G) College, Lucknow, Associated college of University of Lucknow, Lucknow, randomly divided in to four groups, one control group and three experimental groups namely- Control group- 20 subjects, Traditional Suryanamaskar- 20 subjects (experimental group), Proprioceptive Neuromuscular Facilitation exercise group-20 subjects (experimental group) and Proprioceptive Neuromuscular Facilitation Exercise type Suryanamaskar consisting 20 subjects (experimental group). The age of the subjects was college going students of physical education and sports ranging from 17 – 28 years of age, who were also participating in competitive sports at different level of sports competition.

Selection of Variables:

The researcher has selected physical variables body weight, body mass index and fat percentage physiological variables to carry on this study. The study was delimited to the following four categories of variables-

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i. **Physical** – Height, Weight and Body Mass Index.

ii. **Physiological Variables -** Body Composition

Training Procedures:

The treatment to experimental groups B, group-C and group-D was given three days/week or alternate days. It began with two to three repetitions for first four weeks then increases one more repetition of selected treatment to three experimental groups after each of four weeks and so on. Appropriate rest period was also given to subjects after each repetition depending upon the exertion level of the subjects namely 2-5min. rest / recovery was given. During the recovery the subjects were asked to perform loosening and shaking exercises or movement of different body parts. It was recommended in form for slow mild stretching & shaking/massaging of different groups of muscles and deep slow breathing. The first control group-A and three experimental groups were given different treatment to various groups as under-

1. **Control Group-A-** no special treatment was given to control group; these subjects were asked to perform their routine work as they were doing daily life.
2. **Traditional Suryanamaskar group-B:** The twelve Poses/ Asanas of Traditional Suryanamaskar, for this group after discussion with the experts and supervisor the total of twelve postures were selected and considered appropriate for the treatment group-B, Traditional Suryanamaskar. This treatment is banned for backache and spondylitis. It needs naturally healthy person.

Collection of the Data: The subjects were briefed about the study and treatment procedure. A pre-test was taken of all the subjects then all the subjects were divided in to four groups- namely- control group, traditional Suryanamaskar, Proprioceptive Neuromuscular Facilitation exercises group and Modified Proprioceptive Neuromuscular Facilitation type of Suryanamaskar. The treatments were given to three experimental groups and after twelve weeks of training, similar like pre-test, the post test was taken of all the groups. Then the score was written down of each

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subject in register and posted in SPSS software in computer to applied appropriate statistical techniques on the raw data to test the hypothesis as per the objectives of the present study.

Reliability of data: The reliability of the data was established with the help of standardized tests procedure and standardized questionnaires. For the psychological questionnaires the test-retest methods were used to re-emphasize the reliability of the data.

Physiological variable measurements: The selected physiological variables like Body Weight, BMI, Fat Percentage, BMR, were measured by stadiometer, weight machine, Body Composition Analyzer (BCA), instruments as per the guidelines of the User's Manuals.

Statistical technique: The appropriate statistical techniques were computed after the collection of the data of selected variables for the purpose of the study. These statistical techniques include the calculation of detailed descriptive statistics i.e. mean, standard deviation, range, minimum and maximum of the raw scores. For the compression of the four groups, the analysis of covariance (ANCOVA) was also calculated.The appropriate statistical techniques with advice of experts were used and calculated with helps of Statistical Process in Social Sciences-20 (SPSS-20) software in the computer. The level of significance was set at 0.05. Descriptive statistical analyses like mean, SD, standard error, range were calculated on the selected physical variables of present study.

Result and Discussion: The collected data had been analyzed with the help of SPSS Statistics-20 version software by computing the descriptive statistics, ANCOVA and post hoc test LSD were applied, wherever the significant difference ('F' value) was obtained in ANCOVA. The collected data have been computed in the following tables from 1.

Table-1 ANCOVA Applied on the Variable of Body Weight

Source	Sum of Squares	df	Mean Squares	'F'	Sig.
Interaction in Groups	20.53	3	6.84	3.34	0.024

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Error	153.85	75	2.05		
Corrected Total	6609.06	79			

The table no-1 revealed that there was significant difference observed among the four groups as calculated F (3, 75) = 3.34, P < .05. The calculated value was 0.024, which is significant at 0.05 level.

Table-2 ANCOVA Applied on the Variable of Fat Percentage

Source	**Sum of Squares**	**df**	**Mean Squares**	**'F'**	**Sig.**
Groups	13.30	3	4.43	7.97	.000
Error	41.72	75	.56		
Corrected Total	1107.33	79			

The table no. 2 revealed as shown that the descriptive calculation as mean and SD for the four groups of Control, SN, PNF, & PNF SN were 14.47+ 3.02, 15.24 + 4.27, 14.93 + 3.99 and 12.04 + 2.88 respectively and the adjusted means were found to be 14.62, 14.26, 14.28, & 13.49 of the respective groups. The standard error for four groups was .17 and grand mean was 14.16. The table no-2 revealed that there was found significant difference among the four groups as calculated F (3, 75) = 7.97, (.000) at P < .01.

Table: 3 ANCOVA Applied on the Variable BMI

Source	**Sum of Squares**	**df**	**Mean Squares**	**'F'**	**Sig**	
Groups	124.53	3	41.51	44.42	00	
Error	70.09	75	.93			
Corrected Total	434.51	79				

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The table no.3 revealed that the descriptive calculation as mean and SD for four group e.g. Control, SN, Proprioceptive Neuromuscular Facilitation Exercise & Proprioceptive Neuromuscular Facilitation Exercise SN groups were 19.61+ 1.51, 20.59+2.22, 20.07+3.13, & 21.65+1.83 respectively and adjusted mean were 19.47, 19.55, 23.39 & 19.51 of the respective groups. The standard errors for four groups were between .22 and .28 and grand mean was 20.48+2.34. The covariates appearing in the model are evaluated at the following values of pre adjusted BMI Mean of 19.377. The graphical representation of the data is presented in figure-4.3.

The table no-3 revealed that there was found significant difference among the four groups as calculated $F = (3, 75) = 44.42$, at $P < .01$.

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