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Individual and Combined Effects of Suryanamaskar and Pranayama Practices on Flexibility of School Boys

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Abstract

The purpose of study was to find out the individual and combined effects of suryanamskar and pranayama practices on flexibility of school boys. To achieve this purpose of the study, forty school boy's students from Alagappa Physical Fitness Academy, Karaikudi, were randomly selected as subjects. The age of the subjects ranged between 11 and 13 years. The study was formulated as pre and post-test random group design, in which forty subjects were divided into four equal groups. The experimental group-1 (n=10, SNP) underwent suryanamaskar practices, the experimental group-2 (n=10, PP) underwent pranayama practices, the experimental group-3 (n=10, SNP+PP) underwent combined practice of suryanamaskar and pranayama and group 4 served as control group (n=10, CG) did not undergo any specific training. In this study, three training programme were adopted as independent variable, i.e., suryanamaskar practices, pranayama practices and combined practice of suryanamaskar and pranayama. The flexibility was selected as dependent variables and the measurement was recorded in Centimetres. The selected three treatments were performed five days in a week for the period of six weeks, as per the stipulated training program. The selected flexibility was collected before and after the training period. The collected pre and post data was critically analysed with apt statistical tool of one-way analysis of co-variance, for observed the significant adjusted post-test mean difference of three groups. The Scheffe's post hoc test was used to find out pair-wise comparisons between groups. To test the hypothesis 0.05 level of significant was fixed in this study.

Keywords: Suryanamaskar practice, Pranayama practice, Flexibility, ANCOVA.

INTRODUCTION

Yoga is a realistic way of life, not a faith, and needs no loyalty to some exacting scheme of faith. The remark "yoga" arrives from the Sanskrit word "yug", meaning to join yoe or unite. This is traditional Indian philosophy so as to engage the mixing of the spiritual and physical to attain a intellect of wellbeing. By this the body and mind lead to a better correlation to person's awareness. Surrounded by perform of yoga, the body is connected to the movement of breath, mind to carry about a feeling of relaxation, harmony and balance. Man is taught to awaken all his cells and his soul. (Francoise. *et al.,* 2005) Yoga is a practical philosophy, not a religion and requires no allegiance to any particular system of belief. The word "yoga" comes from the Sanskrit word "Yug", meaning to join yoke or unite. It is a traditional Indian Philosophy that involves the integration on the physical and spiritual in order to achieve a sense of wellbeing. This synthesis and inseparability of the body and mind lead to a greater connection to one's consciousness. In the practice of yoga, the body is linked to the movement, mind and breath to bring about a feeling of balance, relaxation and harmony. The practitioner uses the physical self to refine the mind. Through this thorough training of the body and thought, one is taught to awaken every cell of one's self and one's soul. The practice of physical postures (asana) improves a variety of ailments, strengthens and tones muscle and develops flexibility. Various movements in the postures result in blood saturating, nourishing and cleansing the remotest parts of the body. Psychologically, yoga increases concentration, stills the mind and promotes a feeling of balance, tranquility and contentment. There is difference between yoga and other physical exercises.

Yoga asanas are psycho-physiological, while physical jerks are purely external. Asana develops body awareness, muscles and flexibility, as well as generating internal awareness and stabilizing the mind. In physical exercises, body movements may be done with external precision, whereas in yoga, together with the precision, a deeper awareness is awakened, which brings about balance in body and spirit. (Barbira *et al.,*2006) Suryanamaskar, or sun salutation, is of ancient origin and serves as the cornerstone upon which the science of yoga rests according to a well-known teacher of yoga, Shri K. Pattabhi Jois. Through the unique combination of asana, pranayama and meditation, suryamanaskar can be considered to be the ideal way to practice yoga, as it helps to develop the strength of the body and mind on the one hand and to aid in the attainment of spiritual focus on the other. Without bringing the mind to a state in which it can push the body through the various stages of yoga practice, say the texts, students cannot be certain of avoiding injury and of making due progress. The classical yogic practices of pranayama have been known in India for over 4,000 years. In the Bhagavad Gita, a text dated to the Mahabharata period, the reference to pranayama (4:29) indicates that the practices were as commonly known during that period as was yajna, fire sacrifice. Many Upanishads written in the pre-Buddhist period also refer to techniques of pranayama (to attain higher states of consciousness). However, it is in the hatha yoga texts such as Hatha Yoga Pradipika, Gheranda Samhita and Hatharatnavali, written between the sixth and fifteenth centuries AD, that we find a detailed description of the practices. It would seem that a need was felt at that time to revive and codify the practices that were until then handed down through the oral tradition. The Vedic culture had declined with the advent of Buddhism and many yogic practices were being lost or misapplied by their practitioners. Thus, the authors of the texts sought to restore the purity and authenticity of the practices. A need is felt yet again in the twenty-first century to reinstate the original intent and experience of the practices. The yogic renaissance witnessed in the last few decades has made asana and pranayama into household terms, but the essence and depth of the practices remain unexplored for most practitioners. (Swami Niranjanananda Saraswati, 2009)

METHODOLOGY

The experimental group-1 underwent suryanamskar practices, the experimental group-2 underwent pranayama practices, the experimental group-3 underwent combined practice of suryanamaskar and pranayama and group-4 serve as control group did not undergo any specific training. The training period was delimited to six weeks for five days. The details training performance as follows

TRAINING APPROACHES

ADMINISTRATION OF TRAINING PROGRAMMES

1 Suryanamaskar Practices (12 counts)

Activity:	**Suryanamaskar practice (12 count)**		
Weeks	**1-2 weeks**	**3-4 weeks**	**5-6 weeks**
Rep	2	4	5
Rec.in Between set	3 min	3 min	3 min
Set	3	3	3

2. Pranayama Practice

Nadi shodhana pranayama: Inhalation and exhalation for 1 minute.

Activity:	**Nadi shodhana pranayama**		
Weeks	**1-2 weeks**	**3-4 weeks**	**5-6 weeks**
Rep	5	7	10
Rec.in Between set	1 min	1 min	1 min
Set	5	5	5

3. Combined practice of suryanamskar and pranayama practices

Nadi shodhana pranayama: Inhalation and exhalation for 1 minute.

Weeks	**1-2 weeks**		**3-4 weeks**		**5-6 weeks**	
Activity	Suryanamaskar practice (12 counts)	Nadi shodhana pranayama	Suryanamaskar practice (12 counts)	Nadi shodhana pranayama	Suryanamaskar practice (12 counts)	Nadi shodhana pranayama
Rep	2	5	4	7	5	10
Rec.in Bet. set	3 min	1 min	3 min	1 min	3 min	1 min
Set	3	5	3	5	3	5

Table – I: The Results of Analysis of Covariance on Flexibility of Different Groups (Scores in Centimetres)

Test Conditions		Ex-1 SNP	Ex-2 PP	Ex-3 SNP+PP	Gr-4 CG	SV	SS	Df	MS	'F' ratio
Pre test	**M**	15.91	15.67	15.76	15.69	B	0.35	3	0.118	0.23
	S.D.	0.84	0.69	0.51	0.73	W	17.92	36	0.498	
Post test	**M**	20.74	19.16	21.95	15.58	B	229.4	3	76.4	126.6*
	S.D.	0.69	1.10	0.44	0.71	W	21.72	36	0.604	
Adjusted Post test	**M**	20.66	19.20	21.94	15.61	B	223.2	3	74.43	152.6*
						W	17.06	35	0.49	

* Significant at .05 level of confidence. The required tables value for test the significance was 2.87 and 2.87 with the df of 3 and 36, 3 and 35.

RESULTS OF FLEXIBILITY

The pre-test mean and standard deviation on flexibility scores G1, G2, G3 and G4 were 15.91±0.84, 15.67±0.69, 15.76+ 0.51 and 15.69±0.73 respectively. The obtained pre-test F value of 0.23 was lesser than the required table F value 2.87. Hence the pre-test means value of suryanamaskar practices, pranayama practices, combined practice of suryanamaskar and pranayama and control group on flexibility before start of the respective treatments were found to be insignificant at 0.05 level of confidence for the degrees of freedom 3 and 36. Thus this analysis confirmed that the random assignment of subjects into four groups were successful. The post-test means and standard deviation on flexibility of G1, G2, G3 and G4 were 20.74±0.69, 19.16±1.10, 21.95±0.44 and 15.58±0.71 respectively. The obtained post-test F value of 126.6 was higher than the required table F value of 2.87. Hence the post-test means value of suryanamaskar practices, pranayama practices and combined practice of suryanamaskar and pranayama on flexibility were found to be significant at 0.05 level of confidence for the degrees of freedom 3 and 36. The results proved that the selected three training interventions suryanamaskar practices, pranayama practices, combined practice of suryanamaskar and pranayama was produced significant improvement rather than the control group of the sample populations. The adjusted post-test means on flexibility scores of G1, G2, G3 and G4 were 20.66, 19.20, 21.94 and 15.61 respectively. The obtained adjusted post-test F value of 152.6 was higher than the required table F value of 2.87. Hence the adjusted post-test means value suryanamaskar practices, pranayama practices and combined practice of suryanamaskar and pranayama on flexibility were found to be significant at 0.05 level of confidence for the degrees of freedom 3 and 35. The results confirm that the selected three training interventions namely suryanamaskar practices, pranayama practices and combined practice of suryanamaskar and pranayama on flexibility were produced significant difference among the groups In order to find out the superiority effects among the treatment and control groups the Scheffe's post hoc test were administered. The outcomes of the same are presented in the table II.

Table – II: The Results of Scheffe's Post Hoc Test Mean Differences on Flexibility Among the Groups

Ex-1 SNP	Ex-2 PP	Ex-3 SNP+PP	Gr-4 CG	Mean Differences	CI Value
20.66	19.20	-----	-----	1.46*	0.16
20.66	-----	21.94	-----	1.29*	
20.66	-----	-----	15.61	5.05*	
-----	19.20	21.94	-----	2.74*	
-----	19.20	-----	15.61	3.59*	
-----	-----	21.94	15.61	6.33*	

(Scores in Centimetres)

* Significant at .05 level of confidence.

Result of Scheffe's Post Hoc test on flexibility

Table II shows the paired mean differences of suryanamskar practices, pranayama practices and combined practice of suryanamskar and pranayama and control group on flexibility. The pair wise comparisons result as follows. Significant comparisons**:** The comparison between suryanamaskar practices and pranayama practices, suryanamaskar practices and combined practice of suryanamaskar and pranayama, suryanamaskar practices and control group, pranayama practices and combined practice of suryanamaskar and pranayama, pranayama practices and control group, combined practice of suryanamaskar and pranayama and control group shows significant different effect on flexibility. The adjusted post-test mean deference of experimental and control group value graphically represented in the figure 1.

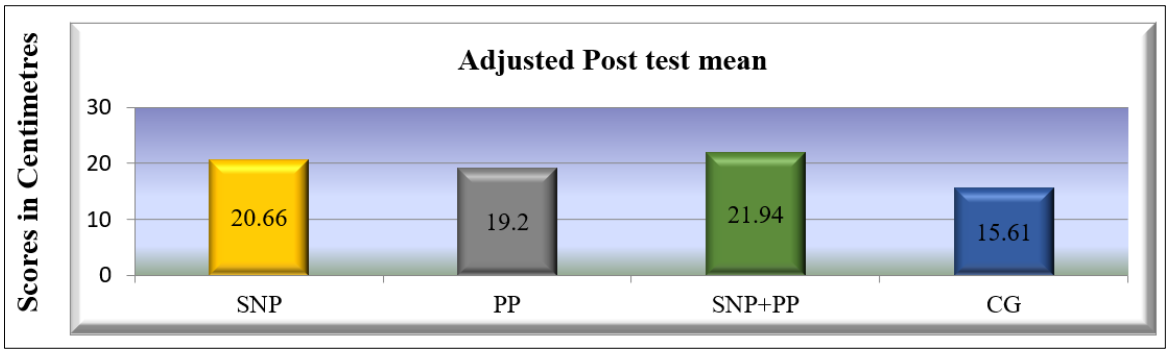

Figure 1: The Adjusted Post Test Mean Values of Experimental and Control Groups on Flexibility

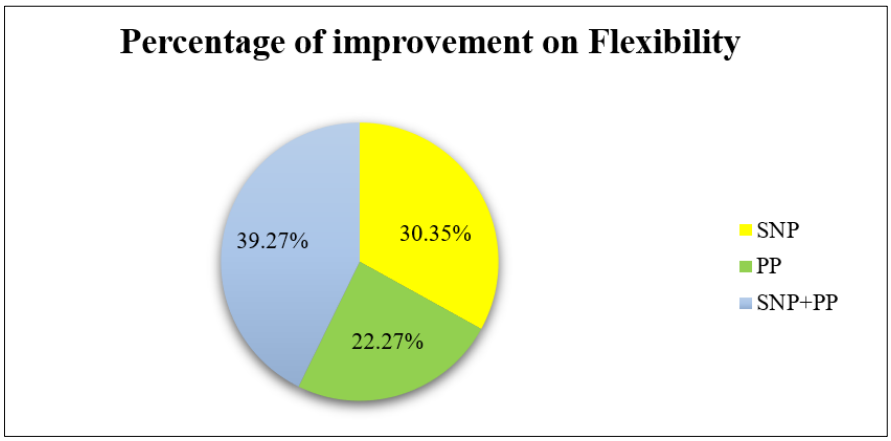

Figure 2: Percentage of Improvement of Experimental Groups on Flexibility

After analysing the statistical end results the researcher found that the selected training groups have significantly improved flexibility from the base line to post interventions. The pre to post intervention was present as follows. The suryanamaskar practices (SNP) group from pre (15.91±0.84), to post (20.74±0.69), pranayama practices (PP) pre (15.67±0.69), to post (19.16±1.10), combined practice of suryanamaskar and pranayama (SNP+PP) pre (15.76+ 0.51), to post (21.95±0.44) has significantly changed the pre to post results. The present study demonstrates an increase in flexibility of 30.35 %, 22.27% and 39.27% for suryanamaskar practices (SNP), pranayama practices (PP), combined practice of suryanamaskar and pranayama (SNP+PP) group respectively. The result of this study prove that the flexibility increased significantly over the six weeks training period for suryanamaskar practices (SNP), pranayama practices (PP), combined practice of suryanamaskar and pranayama (SNP+PP) when comparing control group. However, the combined practice of suryanamaskar and pranayama (SNP+PP) has produced greater effect on flexibility than the other training groups namely suryanamaskar practices (SNP) and pranayama practices (PP). The second-best improvement was found in suryanamaskar practices (SNP) group and least improvement was shown in pranayama practices (PP) group. The control group did not show any improvement on flexibility. The percentage of improvement of experimental groups on flexibility is shown in figure- 2

Sumeet keode and Gauri afle (2022) Effect of Suryanamaskar on upper body verses lower endurance and flexibility amongst children at the end of six-week training (A comparative study), and they concluded that Lower limb flexibility and endurance is improved than upper limb flexibility and endurance. Which was proved statistically significant and the study shows 6 weeks training of suryanamaskar improves in lower body flexibility.in another study conducted by Normi prihantia bintari (2021) conducted a study regarding the effect of hata yoga and namaskar surya yoga on flexibility and balance in women and the study result shows that there is a significant increase in flexibility. Sumeet keode and Gauri afle (2022) Effect of Suryanamaskar on upper body verses lower endurance and flexibility amongst children at the end of six-week training (A comparative study), and they concluded that Lower limb flexibility and endurance is improved than upper limb flexibility and endurance. Which was proved statistically significant and the study shows 6 weeks training of suryanamaskar improves in lower body flexibility. Favro et.al (2025), they found that high-intensity resistance training significantly improved joint flexibility, with exercise intensity and sex as key moderators. However, substantial heterogeneity and high risk of bias limit the strength of these conclusions. Uhammad A'raaf Hidayatullah et.al (2022), the results of this study both passive static stretching and PNF exercises significantly improved flexibility ($p < 0.05$). However, PNF was shown to be more effective based on empirical data. M

Girinathan and I Lillypuspam (2019), research suggest that the submaximal performance training significantly improved flexibility and muscular strength in boxers (F-ratio > 3.06, $p < 0.05$) compared to the control group. These results support its effectiveness in athletic conditioning. Leite TB et.al 2017), the results demonstrated that resistance training alone significantly improved flexibility in certain joints and Sit-and-Reach scores, with the G5S group showing the greatest gains ($p < 0.05$). These results support resistance training as an effective method for enhancing flexibility in young men. Mulugeta Debebe (2019), his result indicates that significant improvements in physical performance among football players in the intervention group compared to the control group. This highlights the positive impact of structured fitness training programs. Sobrinho ACDS et.al (2021), their research established that the 14 weeks of multi component and flexibility training significantly improved flexibility and posture in inactive older women, with the MFT group showing the largest effect sizes (ES > 1.30). Both interventions enhanced movement quality. Maniazhagu Dharuman (2019), his study proves that both training increased the quality of flexibility significantly over the eight weeks training when comparing control group. However, both training produced similar effect on flexibility. In the present study findings in line with above said many study findings. Baljit Singh Sekhon, Maniazhagu Dharuman (2018), they Identified that after 6 weeks, the aerobic training and jump rope training groups demonstrated significant improvement by 0.3% and 0.4% respectively rather than the control group. Carlos Jose Nogueira et.al (2019), their results suggest that that the stretching at maximum intensities (one and three series) and submaximal (three series) reduced the performance of vertical jump, showing that the greater the volume of stretching exercises, the greater the deleterious effects on jump performance. Boryi Alexander Becerra-Patino et.al (2022), research indicates that significant improvements in flexibility and performance measures, including front Spagatta, Squat Jump, and Sit-and-Reach ($p \leq 0.004$). The use of Kinovea also confirmed technical progress in Spagatta execution.

CONCLUSION

The combined practice of suryanamaskar and pranayama (SNP+PP) has produced greater effect on flexibility than the other training groups namely suryanamaskar practices (SNP) and pranayama practices (PP). The second-best improvement was found in suryanamskar practices (SNP) group and least improvement was shown in pranayama practices (PP) group. The control group did not show any significant changes on flexibility

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