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Effect of Ashtanga Vinyasa Surya Namaskar (Type A and B) on Range of Motion among University Students

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Abstract: ***Background: Ashtanga Vinyasa Surya Namaskar comprising 12 sets of asanas, which involve ujjayi breathing technique, has been beneficial in enhancing cardio-pulmonary functions and developing spinal flexibility. It has also resulted in stress reduction and elevation of mood in many participants. Hence, the present study aims to investigate the effect of Ashtanga Vinyasa Surya Namaskar (Type A and B) on the range of motion of university students. Methodology: The present study is conducted on twenty nine male undergraduate students of Visva-Bharati University based on two group pre and post design. The experimental group followed a 20 day session of Ashtanga Suryanamaskar (Type A and B) for sixty minutes, whereas the active control group performed physical exercises. Range of motion was measured in Paschimottanasana to assess flexibility of back using Kinovea software. Results: A significant improvement in the range of motion was observed in the experimental group as compared to the active control group with a p-value less than 0.001 that indicated increase in flexibility. Conclusion: It has been concluded that 20 days practice of Ashtanga Vinyasa Surya Namaskar has proven beneficial in improving the flexibility of university students.***

Keywords: Ashtanga Surya Namaskar, Range of Motion, ROM, Flexibility, University students.

1. Introduction

Ashtanga Vinyasa is one of the most dynamic and physically engaging styles of yoga that comprises physical postures with the synchronization of breath which enhances postural control, muscle strength and the vestibular system (1). This technique involves Ujjayi breathing or victorious breath as well as omphaloskepsis (that is defined as "contemplation to one's navel as an aid to meditation"), hence, this type of yoga is also known as "meditation in motion" (2). Surya Namaskar is a complete technique that comprises a series of asanas associated with breathing. This practice was propagated by Late Shrimant Balasaheb Pratinidhi, King of Aundh in the 1920s and later developed by Sri KV Iyer and Sri Krishnamacharya. Vinyasa Yoga comprises the following sets of asanas in Surya Namaskar: Samasthiti / Pranamasana, Tadasana / Hasta Uttanasana, Uttanasana / Padahastasana, Utkatasana, Chaturanga Dandasana, Danda Samarpana, Chaturanga Dandasana, Urdhva mukha svanasana, Adho Mukha svanasana, Utkatasana, Uttanasana, Tadasana and Samasthtiti (3). A recent study showed that Surya Namaskar has been highly effective in aligning the spine and back through activation of some major muscles of the trunk and body such as: erector spinae and lower trapezius during Hastapadasana, latissimus dorsi during Bhujanagasana, Ashtanga Namaskar and Parvatsana and Gluteus maximus and vastus lateralis in Ashwa Sanchalanasana. Rectus abdominis has been highly activated during Parvatasana (4).

Vinyasa yoga has been found beneficial in Cardio-respiratory functions and reduces weight loss thereby improving the metabolic rate in both males and females, which is proven to be an alternative to aerobic exercise (5). This style of yoga creates a seamless connection between movement and breath that helps in reducing the sympathetic activity, thereby reducing the stress levels (6) and non-HDL cholesterol as well as enhancing the moods of the individuals (7). Enhancement of strength, flexibility and range of motion was observed in Women at risk for breast-cancer related Lymphedema (8). Range of motion denotes the flexibility of the joints that shows the ability of muscle tendons to extend within the physical restriction of the joints. Research by Paulin and Rintaugu showed that Yoga therapy as an intervention for 12 weeks was found useful in improving the range of motion in the shoulder and hip joints (9). Another study has shown that practicing hatha yoga asanas for 20 weeks have resulted in improving the mobility of spinal joints and flexibility of hamstring muscles (10).

Therefore, the present study aims to investigate the effect of Ashtanga Vinyasa Surya Namaskar (Type A and B) on the range of motion of university students. The following are the hypotheses of this study:

Alternate hypothesis - Ashtanga Vinyasa Surya Namaskar (Type A and B) may improve the range of motion of university students.

Null hypothesis - Ashtanga Vinyasa Surya Namaskar (Type A and B) may not improve the range of motion of university students.

2. Subjects and Methods

2.1 Study Design and setting

The present study was based on the two group pre and post design on University students from Bolpur, West Bengal.

2.2 Recruitment of participants

Twenty nine male undergraduate students of Visva-Bharati University participated in the study based on two group pre and post design and they were assigned to both experimental and active control groups. Their age ranged from 19 to 26 years. The study used convenience sampling technique to recruit the subjects. As per the inclusion criteria of the study, the participants must be physically and mentally healthy and they must have signed the informed consent. The participants having any critical health complications and psychological disorders has not been included in the study. The researchers obtained informed consent from the participants to conduct the research, and they were free to participate and withdraw from the research. This study maintained their anonymity and confidentiality throughout**.**

2.3 Parameter measures

The demographic details such as name, age and gender of the participants were collected to conduct this research. The range of motion of the students was measured in Paschimottanasana using the Kinovea software.

2.4 Allocation

In the current study, 29 male undergraduate students were recruited to experimental (N = 13) and active control (N = 16) groups. The active control group performed physical exercises.

2.5 Intervention

The experimental group had undergone intervention for twenty days for a duration of 60 minutes, whereas the active control group performed physical exercises at the same duration for 20 days.

Table 2.5.1

S. No.	Name of the practices	Duration
1	Starting prayer	5 minutes
2	Sukshma Vyayama (loosening practices)	5 minutes
3	Ashtanga Vinyasa Surya Namaskar (A & B)	40 minutes
4	Quick relaxation technique	5 minutes
5	Closing prayer	5 minutes

2.6 Statistical analysis

The statistical analysis software that was used for data analysis was Jeffreys's Amazing Statistics Program (JASP) software. The Mean ± Standard Deviation of pre and post-data scores of the range of motion was measured by performing the descriptive statistics. The p-value was set at 0.05, and the data was checked for normality using the Shapiro-Wilk Test.

3. Results

3.1 Descriptive Statistics

Table 3.1

	Pre ROM	Post ROM
Valid	29	29
Missing	0	0
Mean	38.762	33.783
Std. Deviation	10.444	12.501
Shapiro-Wilk	0.923	0.935
P-value of Shapiro-Wilk	0.035	0.073
Minimum	22.2	15.4
Maximum	59.6	59.2

From the above table 3.1 it is observed that mean ± Standard Deviation (SD) of pre and post range of motion (ROM) are 38.762± 10.444 and 33.783 ± 12.501. The P-value of post Range of motion (ROM) is 0.073 which is greater than the set P-value 0.05. This shows that the data is normally distributed. Hence parametric test i.e., independent sample t test has been applied.

3.2 Group Descriptives

Table 3.2

	Group	N	Mean	SD	SE	Coefficient of variation
Pre ROM	Control	16	44.525	9.753	2.438	0.219
	Experimental	13	31.669	6.071	1.684	.0.192
Post ROM	Control	16	41.263	11.322	2.831	0.274
	Experimental	13	24.577	6.162	1.709	0.251

From the above table 3.2, it is observed that mean ± Standard Deviation (SD) of pre and post range of motion (ROM) of the Control group are 44.525 ± 9.753 and 41.263 ± 11.322. The mean ± Standard Deviation (SD) of pre and post range of motion (ROM) of the experimental group are 31.669 ± 6.071 and 24.577 ± 6.162. It shows that there is reduction in the angle between the hip and abdomen while performing Paschimottanasana in the experimental group as compared to the control group, which denotes increased flexibility of the back with improved range of motion.

3.3 Independent Samples T-Test

Table 3.3

	T	df	P
Pre ROM	4.138	27	< .001
Post ROM	4.761	27	< .001

Note. Student's t-test

From the above table 3.3 it is observed that the p-value of ROM is less than 0.001 which shows significant improvement in the Range of Motion (ROM) after practicing Ashtanga Vinyasa Surya namaskar (Type A and B) for 20 days.

4. Discussion

The current study was performed to investigate the effect of Ashtanga Vinaya Suryanamaskar (Type A and B) on range of motion through Paschimottanasana of University students and significant improvement in the range of motion was

observed in the experimental group as compared to the active control group. The reduction in the angle between the hip and abdomen while performing Paschimottanasana was more in the experimental group as compared to the active control group that denoted increased flexibility of the spinal muscles. Our results confirm with a similar study where it has been found that eight weeks intervention of Ashtanga Yoga on 17 women having high risk of breast cancer related lymphedema showed significant improvement in their range of motion for bilateral shoulder flexion and external rotation along with increased grip strength and shoulder abduction on the affected side as well as bilateral elbow flexion (8). Another study was performed on 65 community dwelling elders with compromised stair climbing who underwent 12 weeks of intervention. The participants were assigned to the intervention and control group. The experimental group underwent Yoga and Physiotherapy as part of their intervention whereas only physiotherapy was given to the control group. After 12 weeks, the results showed more improvement in the range of motion, lower limb muscle strength and balance in the experimental group as compared to the control group (11).

5. Limitations

The study reported certain limitations such as: less sample size and convenience sampling technique was used due to limited availability of sample.

6. Conclusion

The present study was conducted to evaluate the effect of Ashtanga Surya Namaskar (Type A and B) on the range of motion among university students. The result of the study indicates significant improvement in the range of motion (ROM) between the angle of hip and abdomen while performing Paschimottanasana in the experimental group as compared to the control group, which denotes increased flexibility of the back muscles during Paschimottanasana. The increased ROM has broader implications for student well-being. Enhanced flexibility not only promotes better physical performance in daily life but also contributes to reduced risk postural problems and musculo-skeletal injuries, which are prevalent in the sedentary lifestyles. The findings support the hypothesis that Ashtanga Surya Namaskar (Type A and B) is an effective modality to improve the range of motion in university students.

Conflict of interest
There are no conflicts of interest between the authors.

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