

Effects of 4-Week Yogasanas Training on Balance and Agility in Adolescent Girls

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Abstract. The aim of the study is to assess the effects of 4-week yogasanas training on balance and agility in girls. A group of 30 high school girls aged 12-16 years, who participated in interschool yoga competition and in the Catch Them Young (CTY) programme, volunteered to participate in this study. They were randomly assigned into yoga asana (Y) and control (C) groups, n=15 each. The yoga asana (Y) group was subjected to 4-week training consisting of various asanas (Hanumanasana, Saravangasana, Dhanurasana, Chakra-asana, Halasana and Ardha Matsyendrasana). Student's t-test for independent data was used to assess the between-group differences and for dependent data to assess the Post-Pre differences. The level of $p \leq 0.05$ was considered significant. The balance and agility significantly improved in Group A compared with the control one. The yoga asana training may be recommended to improve balance and agility and may contribute to enhance concentration based performance.

Keywords: yogasana, balance, agility, yoginis.

1. Introduction

India has a rich tradition of yogic practices. Now-a-days yoga, the ancient practice of postures, breathing and meditation is gaining a lot of attention from healthcare Professionals. With increasing scientific research in yoga, its therapeutic aspects are also being explored. The word "yoga" has come to describe a means of uniting or a method of discipline: to join the body to the mind and together join to the self (soul), or the union between the individual self and the transcendental self. Ayurvedic texts describe 8 components or arms of Yoga that encompass a philosophy of life: (a) yama (self-restraint); (b) niyama (routines); (c) asana (postures and physical exercises); (d) pranayama (use of breathing to achieve focus); (e) pratyahara (withdrawal of mind from sense organs); (f) dharana (concentration); (g) dhyana (meditation); and (h) samadhi (emancipation). Asana and pranayama have been incorporated alongside Ayurvedic medicine as the basis of a system of medical therapy. Hatha Yoga has become increasingly popular in western countries as a method for coping with stress and as a means of exercise and fitness training [1]. Exercising postures or Asanas in Hatha Yoga has two essential objectives. The first is that to practice any real meditation, one needs at least one posture in which one can be perfectly comfortable for a longer period of time. The more such postures one can master, the better the basis for developing the inner meditation techniques. The second objective of exercising asanas in Hatha Yoga is to bring health and energy to body and mind by opening the nadis. The practice of Hatha Yoga can help you recognize your hidden physical and mental potentials. Through the continued performance of asanas, you will gain flexibility and strength, and learn to be more relaxed under otherwise stressful situations. Hatha yoga is the physical part of yoga practice and is beneficial to the body both mentally and physically. It creates a balance in our physical and mental states. It reduces stress, rejuvenates us and improves circulation. Yoga may be as effective as or better than exercise at improving a variety of health-related outcome measures [2] and as a result this study was undertaken to find out the the effects of 4-week yogasanas training on balance and agility in girls.

2. Material and Methods

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2.1. Subjects

Subjects: A group of high-school girls aged 12 – 16 years, who participated in interschool yoga competitions and in the Catch Them Young (CTY) programme organized by the Department of Sports, Guru Nanak Dev University, volunteered to participate in this study. Their body height ranged from 168 to 172 cm and body mass from 44 to 48 kg. All subjects, after having been informed about the objective and protocol of the study, gave their written consents and the study was approved by the local Committee of Ethics. The subjects were randomly assigned into two groups: experimental (Y; n = 15) and control (C; n = 15). Group Y was subjected to a 4-week yoga asana training, 45 min a day. The training consisted of a variety of yogic asanas (figure 1):

- A-Hanumanasana
- B- Saravangasana
- C- Dhanurasana
- D- Chakra-asana
- E-Halasana
- F- Ardha Matsyendrasana

2.2. Methodology

Standing stork test was used to monitor the development of the athlete's ability to maintain a state of equilibrium (balance) in a static position and Illinois Agility Test was used to measure running agility. The Standing stork test consists raising the heel to balance on the ball of the foot. The total time in seconds is recorded. The score is the best of three attempts. The Illinois Agility Test involves the subject to lie on their front (head to the start line) and hands by their shoulders. On the 'Go' command the athlete gets up as quickly as possible and runs around the course in the direction indicated, without knocking the cones over, to the finish line. The score is the time taken to reach to the finish line.

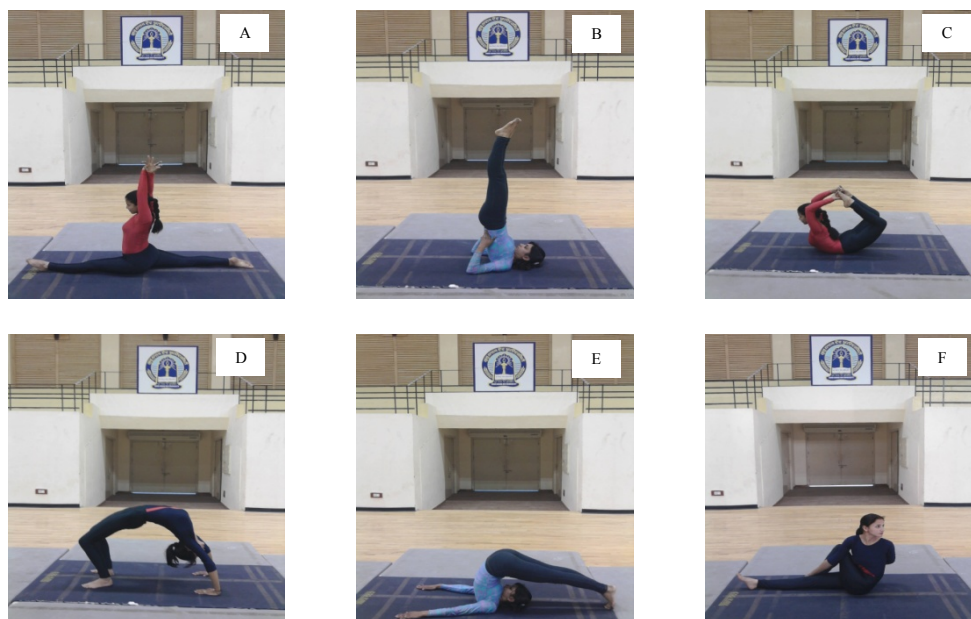


Figure 1. Asanas, A-Hanumanasana, B- Saravangasana, C- Dhanurasana, D- Chakra-asana, E-Halasana, F- Ardha Matsyendrasana

3. Data Analysis

The between-group differences were assessed using the Student's t-test for dependent data. The level of $p \leq 0.05$ was considered significant.

4. Results

The results of balance and agility in adolescent girls from the yoga asana (Y) and control (C) groups are presented in the following tables.

Table 1: Balance of Experimental Group Paired Samples t-Test

	Pre-Test	Post-Test
Sample size	15	15
Arithmetic mean	23.5000	24.5200
95% CI for the mean	20.6340 to 26.3660	21.6677 to 27.372
Variance	26.7843	26.5289
Standard deviation	5.1754	5.1506
Standard error of the mean	1.3363	1.3299
Paired samples t-Mean difference		1.0200
Standard deviation		0.8274
95% CI		0.5618 to 1.4782
Test statistic t		4.775
Degrees of Freedom (DF)		14
Two-tailed probability		P=0.0003

Table 2: Balance of Control Group Paired Samples t-Test

	Pre-Test	Post-Test
Sample size	15	15
Arithmetic mean	22.5533	22.8200
95% CI for the mean	19.4128 to 25.6939	19.6208 to 26.0192
Variance	32.1612	33.3746
Standard deviation	5.6711	5.7771
Standard error of the mean	1.4643	1.4916
Mean difference		0.2667
Standard deviation		0.9919
95% CI		-0.2826 to 0.8159
Test statistic t		1.041
Degrees of Freedom (DF)		14
Two-tailed probability		P=0.3154

Table 3: Mean, Standard Deviation (SD), Standard Error of Mean (SEM) of Balance of Experimental and Control Group

Group	Number	Mean	S.D.	SEM	't' Value
Experiment (Pre-test)	15	23.5000	5.1754	1.3363	4.775
Experimental (Post-test)	15	24.5200	5.1506	1.3299	
Control (Pre-test)	15	22.5533	5.6711	1.4643	1.041
Control (Post-test)	15	22.8200	5.7771	1.4916	

Table-3 shows that the mean of balance of pretest of experimental group and posttest of experimental group was 23.5000 and 24.5200 respectively, whereas the mean of balance of pre test of control and post test of control group was 22.5533 and 22.8200. The "t" value in case of experimental group was 4.775 and for control group it was 1.041. Since cal. t (=4.775) > tab t .05 (14) (=2.145), Ho (null hypothesis) is rejected at .05 level of significance. The graphical representation of responses has been exhibited in figure-2.

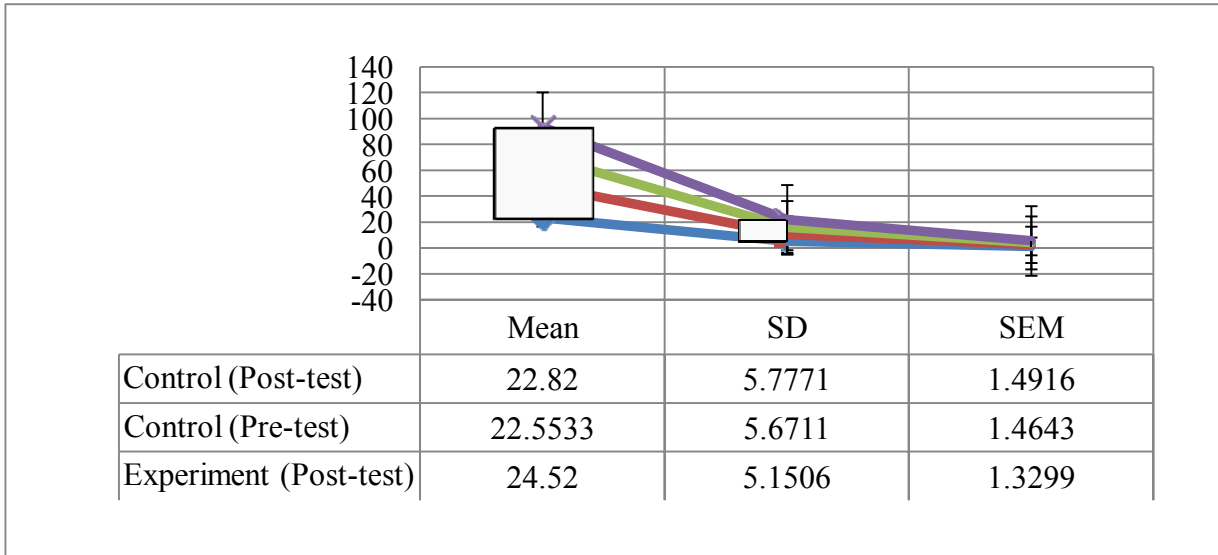


Figure 2: Mean, Standard Deviation (SD), Standard Error of Mean (SEM) of Balance of Experimental and Control Group

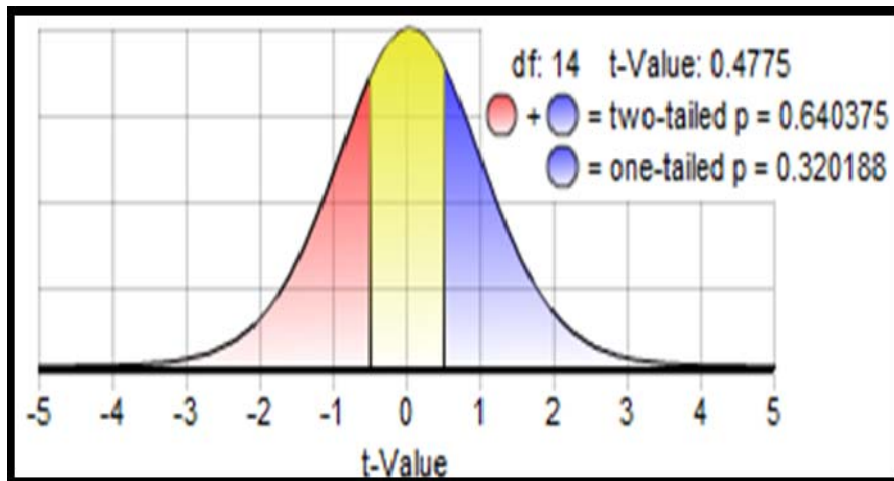


Figure 3: P-Value, Two Tailed and One Tailed Probability Values of a T-Test of Experimental Group of Balance

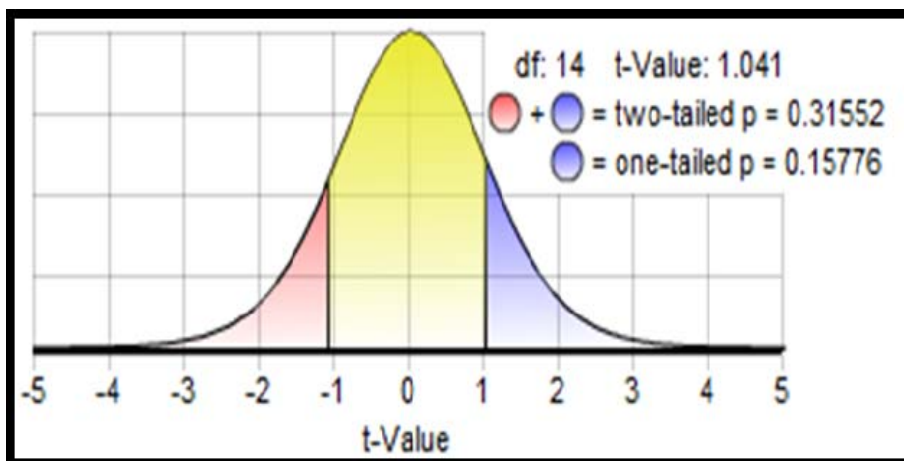


Figure 4: P-Value, Two Tailed and One Tailed Probability Values of a T-Test of Control Group of Balance

Table 4: Agility of Experimental Group Paired Samples t-Test

	Pre-Test	Post-Test
Sample size	15	15
Arithmetic mean	17.4333	16.7200
95% CI for the mean	16.7075 to 18.1592	16.0398 to 17.4002
Variance	1.7181	1.5089
Standard deviation	1.3108	1.2284
Standard error of the mean	0.3384	0.3172
Mean difference		-0.7133
Standard deviation		0.1642
95% CI		-0.8042 to -0.6224
Test statistic t		-16.828
Degrees of Freedom (DF)		14
Two-tailed probability		P<0.0001

Table 5: Agility of Control Group Paired Samples t-Test

	Pre-Test	Post-Test
Sample size	15	15
Arithmetic mean	17.5400	17.4600
95% CI for the mean	16.8538 to 18.2262	16.7709 to 18.1491
Variance	1.5354	1.5483
Standard deviation	1.2391	1.2443
Standard error of the mean	0.3199	0.3213
Mean difference		-0.0800
Standard deviation		0.1320
95% CI		-0.1531 to -0.006891
Test statistic t		-0.2347
Degrees of Freedom (DF)		14
Two-tailed probability		P=0.5380

Table 6: Mean, Standard Deviation (SD), Standard Error of Mean (SEM) of Agility of Experimental and Control Group

Group	Number	Mean	S.D.	SEM	't' Value
Experiment (Pre-test)	15	17.4333	1.3108	0.3384	-16.828
Experimental (Post-test)	15	16.7200	1.2284	0.3172	
Control (Pre-test)	15	17.5400	1.5354	0.3199	-0.2347
Control (Post-test)	15	17.4600	1.5483	0.3213	

Table-6 shows that the mean of agility of pre test of experimental group and post test of experimental group was 17.4333 and 16.7200 respectively, whereas the mean of agility of pretest of control and posttest of control group was 17.5400 and 17.4600. The "t" value in case of experimental group was -16.828 and for control group it was -0.2347. Since cal. t (=16.828) > tab t .05 (14) (=2.145), Ho (null hypothesis) is rejected at .05 level of significance. As per the study the above remark can be given at 95% confidence. The graphical representation of responses has been exhibited in figure-4.

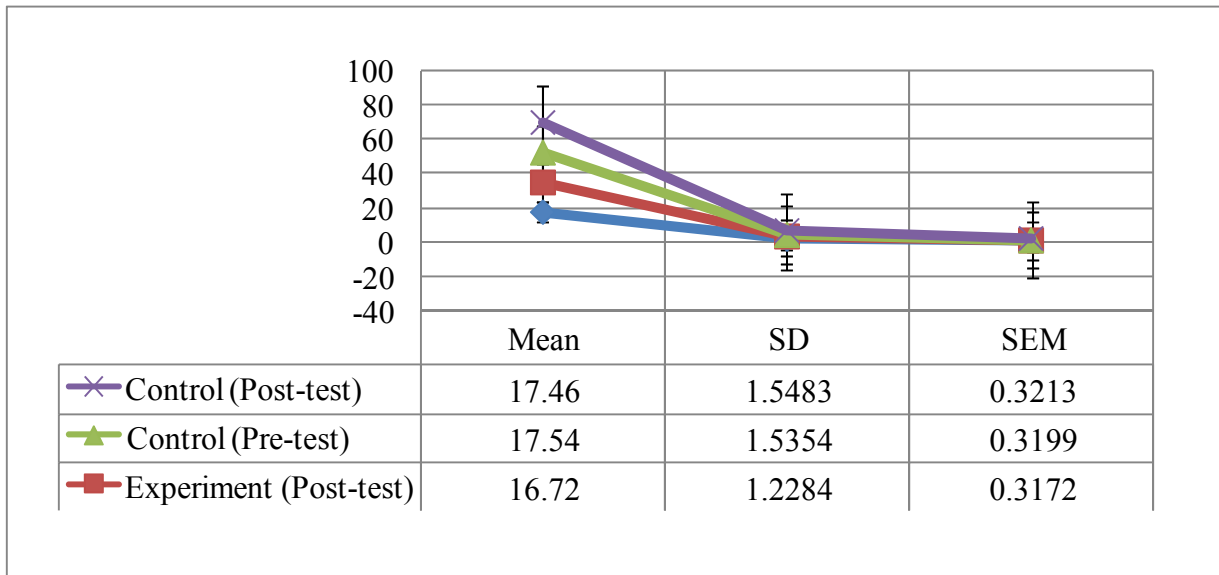


Figure 5: Mean, Standard Deviation (SD), Standard Error of Mean (SEM) of Agility of Experimental and Control Group

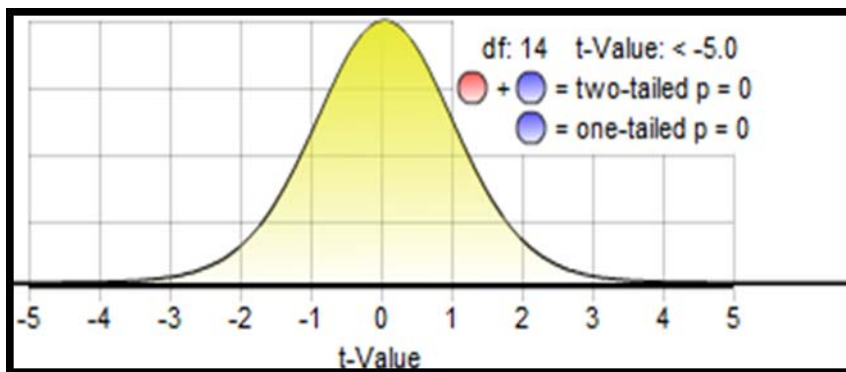


Figure 6: P-Value, Two Tailed and One Tailed Probability Values of a T-Test of Experimental Group of Agility

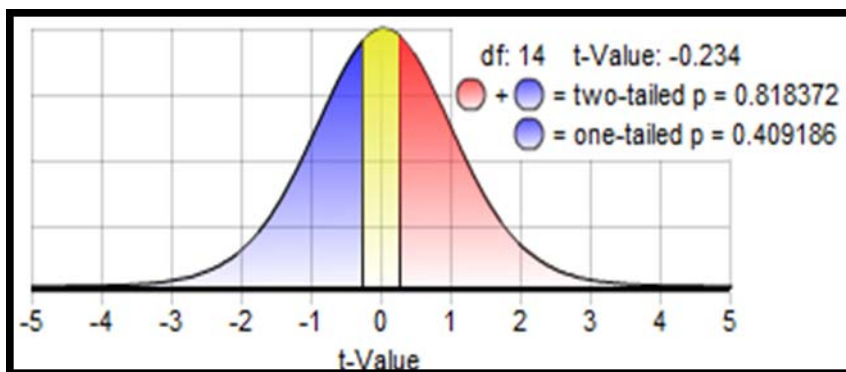


Figure 7: P-Value, Two Tailed and One Tailed Probability Values of a T-Test of Control Group of Agility

5. Discussion

Yoga asanas are psychophysical practices to culture body and mind. Yoga practices are known to significantly improve health status, and reduce stress and anxiety [3]. In this study, the 4-week of yogasanas training programme showed significant improvement in balance and agility. These findings are supported by other reports. Hatha-yoga exercises provided regular functioning of principal bodily functions thus fostering

a psychophysical balance; moreover, transcendental meditation increased aerobic metabolism, counteracting anaerobic metabolism which was related to mental distress [4]. Yoga asanas were also shown to improve flexibility and health perception [5]. The study conducted by Marieke Van Puymbroeck, Laura L. Payne and Pei-Chun Hsieh titled "A Phase I Feasibility Study of Yoga on the Physical Health and Coping of Informal Caregivers" concluded that, caregivers in the yoga group showed trends toward improvement in the lower body strength, upper body strength, upper body flexibility and balance and agility [6].

6. Conclusions

In conclusion, the present study suggests that a 4-week of yoga asanas training had significant effect on balance and agility through a variety of effects including relaxation, stretching, and balancing of muscles, mobilisation of joints, improvement of posture and breathing, action on pressure points, calming the nervous system and improving homeostasis [7]. These data provide more evidence to support the beneficial effect of yoga asana training on balance and agility and thus, such training may be recommended to enhance concentration based performance.

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8. References:

- [1] F.J. Schell, B. Allolio, O.W. Schonecke. Physiological and psychological effects of Hatha-Yoga exercise in healthy women. *Int J Psychosom.* 1994, **41**:46-52.
- [2] A. [Ross](#), S.J. Thomas. The health benefits of yoga and exercise: a review of comparison studies. 2010, **16**: 3-12.
- [3] C.S. Hancock, J.B. Mortimer, K.Eckert. A randomised comparative trial of yoga and relaxation to reduce stress and anxiety. *Complement.Ther.Med.* 2007, **15**: 77-83.
- [4] M.Lerne.Recent medical research on yoga and states of concentration. *A.Psiquiatr.Psicol.Am.Lat.* 1975, **21**: 56-63.
- [5] V.Cowen, T.Adams. Physical and perceptual benefits of yoga asana practice: results of a pilot study. *J.Bodywork Movem.Ther.* 2005, **9**:211-219.
- [6] M.V. Puymbroeck, L.Laura. Payne and Pei-Chun Hsieh A Phase I Feasibility Study of Yoga on the Physical Health and Coping of Informal Caregivers. Oxford Journals, Medicine Evidence-based Compl and Alt. Medicine. 2007, pp. 519-529.
- [7] R. Monro. Yoga therapy. *J.Bodywork Mov.Ther.* 1997, **1**: 215-218.

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