



STUDY ON SELECTED PHYSIOLOGICAL COMPONENT AND COORDINATIVE ABILITIES OF DISTRICT LEVEL YOGA PRACTITIONER GYMNAST AND SEDENTARY GIRLS STUDENTS

¹Chitra Bhar, ²Dr. Laden Lepcha, ³Prof. Madhab Chandra Ghosh

¹Research Scholar, ²Assistant Professor, ³Retd. Professor

Department of Physical Education
University of Kalyani, Nadia, West Bengal, India

Abstract: The ability to execute quick, accurate, and controlled motor responses as well as the ability to select the right muscle for the right action at the right moment are known as coordination. The purpose of the study was to determine the effect of yoga and gymnastics training on specific Physiological Variable and Coordinative Abilities. Total 60 girls aged between 14-18 years were selected for this study. The subjects were purposively selected and were divided into three groups- (1) Yoga Group (N=20), (2) Gymnastics Group (N=20) and Sedentary Group (N=20). Yoga and Gymnastics groups were district level players and have minimum two years of training age and Sedentary group were not associated with any particular sports. Coordinative Abilities i.e Differentiation ability and Balance ability were tested through Backward medicine ball throw test and Stroke stand test respectively whereas specific Physiological variable such as Breath Holding Ability was measured by total time of breath hold which was recorded in seconds. Descriptive statistics and ANOVA were used and the significance level was observed in 0.05 level of significance.

Index Terms: Yoga, Gymnastics, Sedentary, Coordinative abilities, Breath holding ability

1.Introduction

Yoga is form of isometric exercise. Regular practice of yoga basically improves flexibility and coordinative abilities and other physiological components. (Donahoe-Fillmore & Grant, 2019). An integrated yoga training programme as an additional exercise in accordance with the standard physical activities improve coordinative abilities such as static and dynamic balance, reaction time and eye hand coordination (Umesh & Suresh, 2018). Yoga treatment improved with their fatigue, balance, step length, and walking speed in MS patients. (Guner et.al, 2015). Yoga breathing techniques have positive impact on breath holding abilities. (Saoji et.al 2018). Application of aerobic dance and yogic practice training programme can improve differentiation ability and space orientation ability (Ramaiah, 2018). According to Arjun, P. V., & Sunitha, K. B. (2019) yogic training improved coordinative abilities namely eye-hand coordination, static balance, dynamic balance and reaction time.

Gymnastics is an exciting activity where different skills are measured by the execution of a variety of simple and complex elements on various apparatuses. Gymnastics is an activity which require high flexibility and coordinative abilities i.e.- differentiation ability, orientation ability, reaction ability, rhythm ability and balance ability. It has confirmed that coordinative abilities are improved through gymnastics (Abdel, 2016). Gymnastics are linked directly to coordinative abilities; individual can control motor performance and can control motor movement by developing coordinative abilities. Gymnasts generally performed better than swimmers or ice hockey players in the test protocols. Specifically, gymnasts scored higher than ice hockey players and swimmers. (Jaakkola et.al 2017). According to Fotiadou et.al (2009) 12-week gymnastics program improved balance ability of adults with intellectual disability.

Coordinative abilities determine how new motor acts are learned, practised and become stable over a time. It also facilitate the effective execution of motor acts and activities under the variety of conditions, greater use of the other conditional abilities and restructuring.

There are various types of coordinative abilities

Coordinative abilities can be classified into seven categories i.e- Differentiation ability, Orientation ability, Coupling ability, Reaction ability, Balance ability, Rhythm ability and Adaptation ability.

Objectives: The main purpose of the study was to compare Differentiation Ability, Balancing Ability and Breath Holding Ability among the yoga group, the gymnastics group and the sedentary school going girls students.

2. Methodology

For this present study age, height, weight of the subjects was taken as personal data and Differentiation Ability, Balancing Ability and Breath Holding Ability were measure as criterion measure.

Sampling Method: Researcher collected data by using purposive random sampling method. Total sixty (60) female aged between 14-17 years were selected for this study. Among them 20 females were district level yoga practitioners, 20 females were district level gymnastics players and 20 females were sedentary girls' students.

Tool for Data Collection: For collecting data, backward medicine ball throw test was taken for Differentiation Ability and total five chances were given in this test. Subject were asked to throw the medicine ball backwardly in 6*3 m² area from behind the restraining line which is 2 meters away from the target area. Total five chances were given for each subject. Stroke stand test were taken for static balance test and total two chances were given for each leg and best timing were selected. Breath holding time was consider as the measurement of breath hold test. Subjects were asked to hold breath as much as the subject can.

Statistical Analysis of the Data: To observe the differences among three groups researcher used descriptive statistics i.e.- Mean, SD and comparative statistics i.e.- ANOVA and LSD by using SPSS software 25 version.

3.Results

Different standardized tests were used to measure Orientation Ability, Balance Ability and Breath Holding Ability. The performance score of the subjects were presented in numerical score for each variable.

Table 1

Presented Personal Data (Mean±SD) of the subjects

Variables	N	Yoga (Mean±SD)	Gymnastics (Mean±SD)	Sedentary (Mean±SD)
Age(years)	20	15.25±1.21	15.4±1.27	15.5±1.15
Height(cm)	20	152.55±7.35	146.3±7.56	149.85±6.28
Weight(kg)	20	44.75±8.92	38.6±7.35	44.25±8.92

It is presented in Table no.1 that the Mean and SD values of age(years) of Yoga, Gymnastics and Sedentary students were 15.25±1.21, 15.4±1.27 and 15.5±1.15. Similarly, the Mean and SD values of height(cm) of Yoga, Gymnastics and Sedentary students were 152.55±7.35, 146.3±7.56 and 149.85±6.28. Similarly, the Mean and SD values of weight (kg) of Yoga, Gymnastics and Sedentary students were 44.75±8.92, 38.6±7.35 and 44.25±8.92 respectively.

Figure 1

Graphically representation of age of Yoga, Gymnastics and Sedentary students.

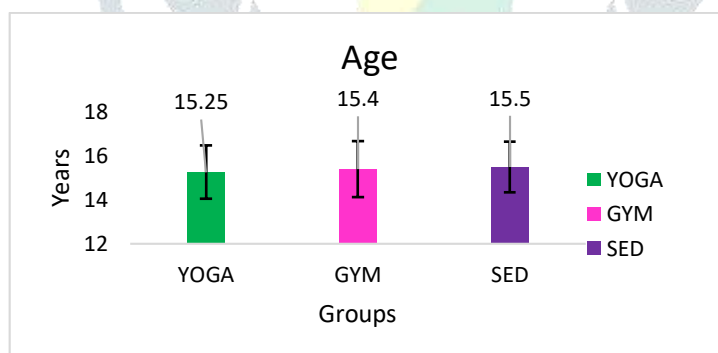


Figure 2

Graphically representation of height of Yoga, Gymnastics and Sedentary students.

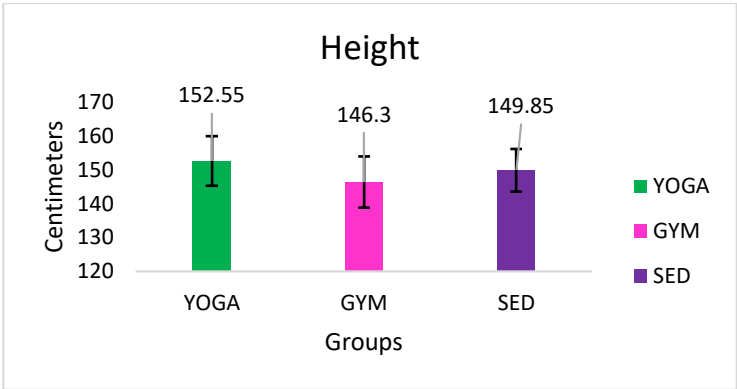


Figure 3

Graphically representation of weight of Yoga, Gymnastics and Sedentary students.

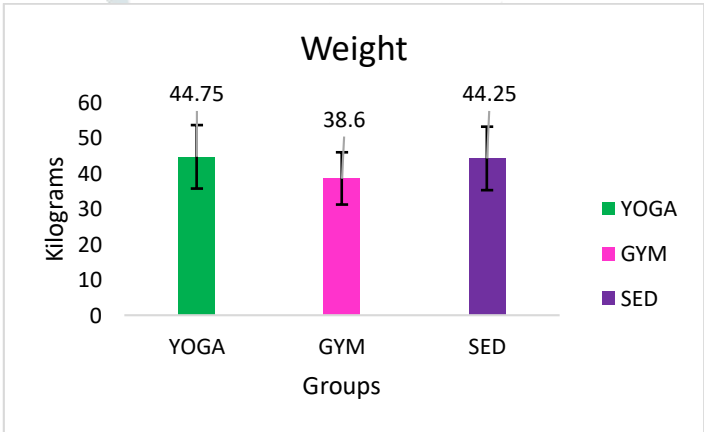


Table 2

Presented Mean, SD and F-value of Differentiation ability of Yoga, Gymnastics and Sedentary students

	Yoga	Gymnastics	Sedentary
Mean±SD	6.50±1.85	8.55±2.19	7.10±2.10
df		2, 57	
F-value		9.28 ^s	

F-value=9.28^s, S- Significance at 0.05 level of Confidence $F_{0.05}^{(2, 57)}=3.15$

In table no-2, it was observed that Mean and SD value of Differentiation ability of Yoga, Gymnastics and Sedentary group were 6.50±1.85, 8.55±2.19 and 7.10±2.10 respectively. To observe the differences among

the groups F-value was calculated and the F-value was found 9.28, which was statistically significant at 0.05 level.

As the F-value was found significant, LSD was calculated and presented in table no-2 to observed the difference between groups.

Table 3

Presented LSD (Least Significant Difference) of Differentiation ability of Yoga, Gymnastics and Sedentary students

	Yoga	Gymnastics	Sedentary
Yoga	-----	2.05 ^S	0.25 ^{NS}
Gymnastics	2.05 ^S	-----	2.30 ^S
Sedentary	0.25 ^{NS}	2.30 ^S	-----

df=38, S-significance at 0.05 level of confidence. NS-not significance at 0.05 level of confidence. $t_{0.05}^{38}=2.02$

From the table no-3, it was observed that a significant difference exists between Yoga group and Gymnastics group, Sedentary group and Gymnastics group. Gymnastics group was found better in Orientation Ability than yoga and sedentary group. No significant difference was found between Yoga and Sedentary group in Orientation Ability.

Figure 4

Graphically representation of Mean and SD of Differentiation Ability of yoga gymnastics and sedentary students

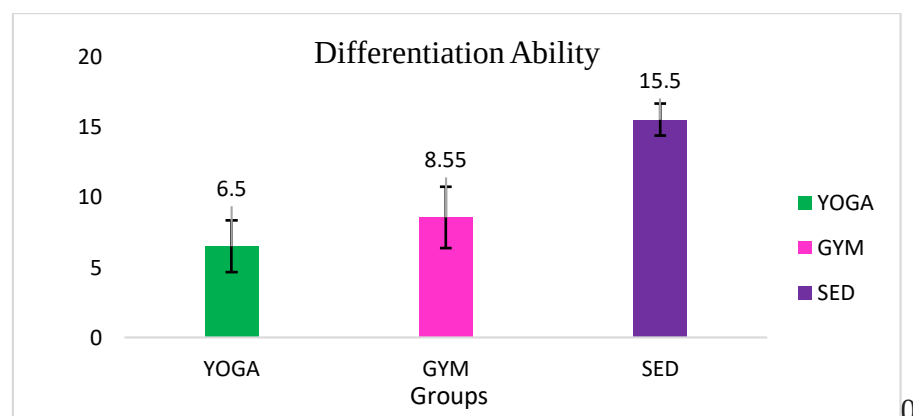


Table 4

Presented Mean, SD and F-value of Balance Right Leg and Left Leg of Yoga, Gymnastics and Sedentary students

		Yoga	Gymnastics	Sedentary
Balance Right Leg	Mean±SD	16.42±5.35	17.51±12.09	6.77±4.80
	df		2,57	
	F-value		10.61^s	
Balance Left Leg	Mean±SD	17.06±5.70	17.69±13.83	6.40±3.44
	df		2,57	
	F-value		10.25^s	

Right leg F-value=10.61^s, Left leg F-value=10.25^s, Significance at 0.05 level of confidence
 $F_{0.05}^{(2,57)}=3.15$

In table no-4, it was observed that Mean and SD value of Balance Right Leg of Yoga, Gymnastics and Sedentary group were 16.42±5.35, 17.51±12.09 and 6.77±4.80 respectively and calculated F-value was 10.61, which was statistically significant at 0.05 level of significance and Mean and SD value of Balance Left Leg of Yoga, Gymnastics and Sedentary group were 17.06±5.70, 17.69±13.83 and 6.40±3.44 respectively and calculated F-value was 10.25, which was statistically significant at 0.05 level of significance.

As the F-value is significant, LSD was calculated and presented in table no-5 to observed the difference between groups.

Table 5

Presented LSD of Balance Ability of Yoga, Gymnastics and Sedentary students

	Balance Right Leg			Balance Left Leg		
	Yoga	Gymnastics	Sedentary	Yoga	Gymnastics	Sedentary
Yoga	—	1.09 ^{NS}	9.66^S	—	0.64 ^{NS}	10.65^S
Gymnastics	1.09 ^{NS}	—	10.74^S	0.64 ^{NS}	—	11.30^S
Sedentary	9.66^S	10.74^S	—	10.65^S	11.30^S	—

df=38, S-significance at 0.05 level of confidence. NS-not significance at 0.05 level of confidence. $t_{0.05}^{38}=2.02$

From the table no-5 it was observed that significant difference exists between Yoga and Sedentary group, Gymnastics and Sedentary group. Gymnastics group was found better than Sedentary Group and yoga group. There was no significant difference was found between Yoga and Gymnastics group.

Fig 5: Graphically representation of Mean, SD of Balance Right and Left Leg of yoga gymnastics and sedentary students

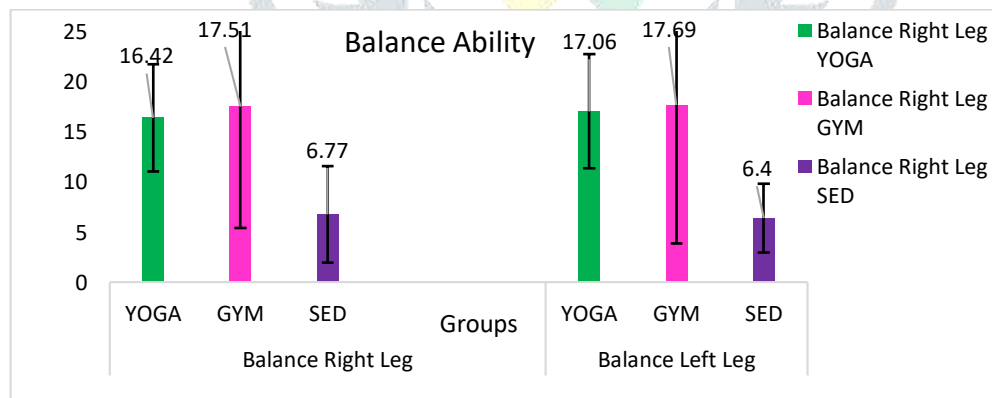


Table 6

Presented Mean, SD and F-value of Breath holding ability of Yoga, Gymnastics and Sedentary students

	Yoga	Gymnastics	Sedentary
Mean±SD	44.82±13.11	28.31±12.59	26.24±7.92
df		2, 57	
F-value		15.83 ^s	
F-value=15.83 ^s , S- Significance at 0.05 level of confidence $F_{0.05}^{(2, 57)}=3.15$			

In table no-6, it was observed that Mean and SD value of Breath Holding Ability of Yoga, Gymnastics and Sedentary group were 44.82±13.11, 28.31±12.59 and 26.24±7.92 respectively and calculated F-value was 15.83, which was statistically significant at 0.05 level of significance.

Table 7

Presented LSD of Breath holding ability of Yoga, Gymnastics and Sedentary students

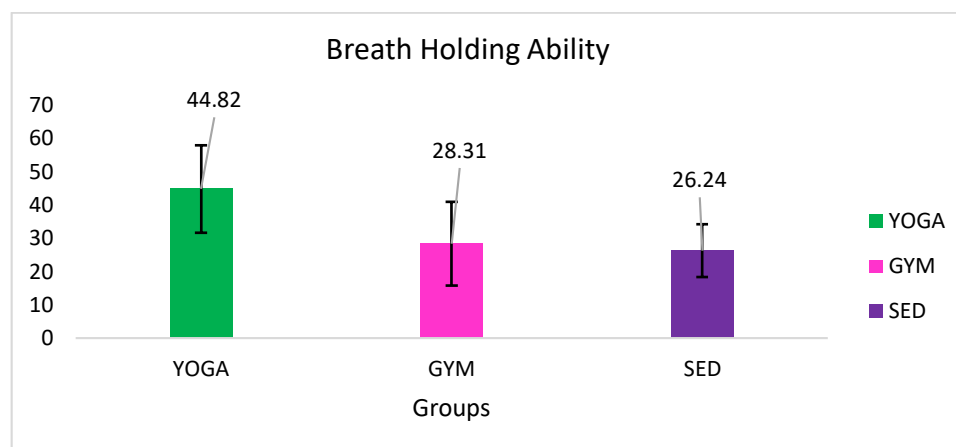
	Yoga	Gymnastics	Sedentary
Yoga	-----	16.52 ^S	18.59 ^S
Gymnastics	16.52 ^S	-----	2.07 ^{NS}
Sedentary	18.59 ^S	2.07 ^{NS}	-----

df=38, S-significance at 0.05 level of confidence. SN-not significance at 0.05 level of confidence.

$$t_{0.05}^{38}=2.02$$

From the table no-7 it was observed that a significant difference was found between Yoga and Gymnastics group and also observed a significant difference between Yoga and Sedentary group. Yoga group was found better than Gymnastics and Sedentary group. No significant difference was found between Gymnastics and Sedentary group.

Fig 6: Graphically representation of Mean, SD of Breath Holding Ability of Yoga Gymnastics and Sedentary students



4. Discussion of Findings

It has been observed that there were very few studies on the effects of yoga and gymnastics and their comparison with sedentary people. Therefore, this study examined the impact of yoga and gymnastics on the development of specific physiological variables and coordinative abilities. For this study, the yoga and gymnastics groups were selected from those who were district level players and had a minimum training age of two years. The sedentary group students were not associated with any particular sport except their daily routine. The results of this present study indicate that gymnastics affects selected coordinative ability, i.e. differentiation ability. From the interpretation of data, it was clear that the gymnastics group was better in differentiation ability than the yoga group. Vine, W. (2018) observed differentiation ability between the gymnastics and dancer group and not found any significant difference. The results of the study also showed that the gymnastics group was better than the yoga and sedentary groups in balance ability. Donahoe-Fillmore, B. and Grant, E. (2019) suggested that yoga training program improved balance ability as well as strength and flexibility. Umesh, U. and Suresh, C. (2018) were studied on “Effect of yoga training on coordinative abilities of high school students”. They reported that yoga training improves static and dynamic balance. This study showed that the yoga group was better than the gymnastics and sedentary groups in breath holding ability. Saoji et al. (2018) suggested that the yogic technique has a positive effect on breath holding capacity. The results of this study also support previous study.

5. Conclusion

From the above study it can be concluded that –

1. Regular practice of gymnastics helps to improve Coordinative Abilities namely Differentiation ability.
2. Yogic training and gymnastics both helps to improve Balance Ability but the gymnastics training group was better in improving static balance in comparison to yoga group.
3. Yoga training programme also help to improve Breath Holding capacity.

References

1. Abdel-Nabi Issa, S. (2016). Effect of developing coordination abilities on improving performance level for gymnastics for all shows players. *Journal of Applied Sports Science*, *6*(1), 39-46. [10.21608/JASS.2016.84541](https://doi.org/10.21608/JASS.2016.84541)
2. Arjun, P. V., & Sunitha, K. B. (2019). Effect of yoga training on coordinative abilities of high school students. *International Journal of Yogic, Human Movement and Sports Sciences*, *4*(2), 63-65. <https://www.theyogicjournal.com/pdf/2019/vol4issue2/PartB/4-2-2-191.pdf>
3. Donahoe-Fillmore, B., & Grant, E. (2019). The effects of yoga practice on balance, strength, coordination and flexibility in healthy children aged 10–12 years. *Journal of body work and movement therapies*, *23*(4), 708-712. <https://doi.org/10.1016/j.jbmt.2019.02.007>
4. Fotiadou, E. G., Neofotistou, K. H., Sidiropoulou, M. P., Tsimaras, V. K., Mandroukas, A. K., & Angelopoulou, N. A. (2009). The effect of a rhythmic gymnastics program on the dynamic balance ability of individuals with intellectual disability. *The Journal of Strength & Conditioning Research*, *23*(7), 2102-2106. <https://w.researchgate.net/profile/Manolya-Akin/publication/274133853>

5. Guner, S., & Inanici, F. (2015). Yoga therapy and ambulatory multiple sclerosis assessment of gait analysis parameters, fatigue and balance. *Journal of bodywork and movement therapies*, 19(1), 72-81.
<https://doi.org/10.1016/j.jbmt.2014.04.004>
6. J, T., Watt, A., & Kalaja, S. (2017). Differences in the motor coordination abilities among adolescent gymnasts, swimmers, and ice hockey players. *Human Movement*, 18(1), 44-49.
<https://doi.org/10.1515/humo-2017-0006>
7. Ramaiah, A., & Amudhan, E. (2018). Combined effect of aerobic dance and yogic practice on selected coordinative abilities of school boys. *Asian Journal of Multidimensional Research(AJMR)*, 7(2),976.
<https://www.indianjournals.com/ijor.aspx?target=ijor:ajmr&volume=7&issue=2&article=158>
8. Saoji, A. A., Raghavendra, B. R., Rajesh, S. K., & Manjunath, N. K. (2018). Immediate effects of yoga breathing with intermittent breath holding on response inhibition among healthy volunteers. *International Journal of Yoga*, 11(2), 99. [10.4103/ijoy.IJOY_65_16](https://doi.org/10.4103/ijoy.IJOY_65_16)
9. Singh, H. (1991). *Science of sports training*. New Delhi: DVS Publication, 5.
10. Umesh, U., & Suresh, C. (2018). Effect of yoga training on coordinative abilities of high school students. *International Journal of Physiology, Nutrition and Physical Education*, 3(1),1216-1218.
<https://www.journalofsports.com/pdf/2018/vol3issue1/PartV/3-1-277-575.pdf>
11. Vinu, W. (2018). Analyse of coordinative abilities among dancers and rhythmic gymnasts. *International Journal of Yogic, Human Movement and Sports Sciences*, 3(1), 334-335.
<https://www.theyogicjournal.com/pdf/2018/vol3issue1/PartF/3-2-11-752.pdf>