Change of Static Balance with Respect to Age for 8-12 Years School Girls

Md. Zillur Rahman, Md. Zafiroul Islam

Abstract— Balance is a coordinative factor of motor ability of an individual. Balance is broadly classified into two types – static balance and dynamic balance. Balance performance has been reported to show an inverted U-shape relationship with age across the life span. Purpose of the present study was to analyze the change in static balance with respect to age for 8-12 years' schoolgirls. One hundred schoolgirls equally distributed into five age groups from eight to twelve years were selected as subjects. Static balance of the subjects was tested by Stork Stand test. Results indicated that the performance in static balance improved year to year from eight to twelve years. The improvement of static balance was found to statistically significant from nine to ten and eleven to twelve years.

Index Terms— Balance, Static balance, Schoolgirls

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1 INTRODUCTION

BALANCE is a state of equilibrium where the resultant of all forces acting on a body becomes zero. Thus, in the state of balance, the body does not exhibit the tendency to have motion. One of the conditions to be fulfilled for maintaining balance is to keep the body's center of mass within base of support. Balance is considered as a coordinative factor for motor ability of the body. It is a component of performance related fitness. Balance is broadly classified into two types – static and dynamic. Static balance indicates a motionless state, and the dynamic balance refers a moving state of the body.

The development of balance performance throughout youth has been an area of research interest as it may assist in the early identification of diseases or disorders, designing training regimes, or understanding deteriorating balance performance in older adults and seniors. Balance performance shows an inverted U-shaped relationship with age across the lifespan illustrating increasing performance in youth, peak performance in young adults, and decreasing performance in seniors (Granacher, Muehlbauer, Gollhofer, Kressig, Zahner: 2011). As indicated by for instance balance performance reportedly improves from early childhood onwards. However, there is still conflicting evidence whether these developments lead to differences in balance performance between school-aged children (6–12 years) and adolescents (13–18 years). Some authors found balance performance in children at the end of the first decade of life (i.e., 7-10-year-olds (Shumway, Woollacott:2017) becomes equal or even better than balance performances of adolescents. Other studies (Hirabayashi and Iwasaki :1995; Steindl, Kunz, Fischer, Scholtz :2006), however, reported better balance performances for adolescents compared to children. Hence, the true extent of age-related differences in balance performance in youth remains debatable. With this background, present study was planned with the

purpose to analyze the change of static balance with increase of age from 8 -12 years for girls.

2 PROCEDURE FOR PAPER SUBMISSION

2.1 The Subject

A total of 100 school girls equally selected from five age groups (8-12 years) were the subjects for the present study. So, there were 20 subjects in each age group. The mean height and weight of the subjects were 129.15 cmand 22.95 kg for eight years,130.35cmand23.8kg for nine years ,140.5cm and 29.6 kg for ten years, 142.75 cm, and 32.2 kg. for eleven years' age and146.6 cmand 33.65 kg for twelve years' age group respectively.

2.2 Criterion Measure

Static balance was the criterion measure for the present study and it was tested by Stork Stand Test.

2.3 Tools Used

Digital Stop Watch, Weighing machine, Stadiometer

2.4 Procedure for Collecting Data

The information regarding date of birth for calculating age was collected from school records. Body height and weight of the subjects were measures using standard procedure. Static balance was the criterion measure for the present study, and it was tested by Stork Stand Test. Static balance was measured in form of duration of maintaining balance and expressed in second unit.

2.5 Analytical Procedure

The collected data were analysed using appropriate statistical procedure. Mean was calculated as the measure of central tendency; standard deviation was calculated as measure of variability and Significance of difference between two means was measured by calculating 't' value.

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3 RESULTS AND DISCUSSION

Mean and standard deviation of static balance expressed as duration in secondfor maintaining balance for different groups of subject have been presented in Table- 1.

Table-1
Mean and sd of static balance for different groups of girls

Age group	Duration of maintaining Balance (s)	Standard Deviation (s)
8 years	141.19	±12.78
9 years	146.49	±27.11
10 years	161.91	±28.50
11 years	164.69	±32.55
12 years	189.27	±45.00

It is seen from the table that the mean values of performance for maintaining static balance steadily increased from eight years to 12 years of age. It is also seen that the heterogeneity of performance within the group also increased from year to year. Mean values of performance in static balance for different groups of subjects have been presented in Figure-1.

Figure-1
Mean values of performance in static balance for different groups of subjects
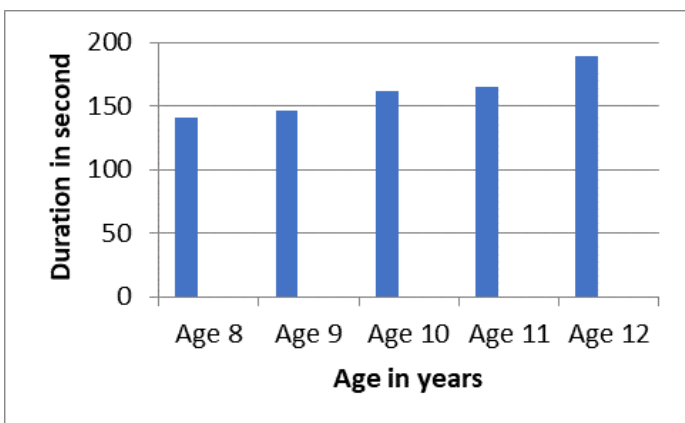
As there was increase in performance of balance ability from year to year, the statistical significance of increase was tested using 't' test. Table -2 shows the results.

Table-2
Testing of significance of yearly increase in mean values of

Group Difference Between (yrs)	Mean values of static balance (s)for					Mean difference (s)	't' values	Remarks
	8 yrs	9 yrs	10 yrs	11 yrs	12 yrs			
8-9	141.19	146.49				5.3	0.79	Non-significant
9-10		146.49	161.91			15.42	1.75	Significant
10-11			161.91	164.69		2.78	0.29	Non-significant
11-12				164.69	189.27	24.58	1.89	Significant

Performance in static balance
't' (0.05) with df of 38= 1.67

It is seen from the table values that the improvement of static balance from 9 to10 yrs. and from 11to12 yrs. were statistically significant at 0.05 level. But, the increase in performance in static balance for girls from 8 to 9 yrs. and from 10 to 11 years was not statistically significant.

4 RESULTS AND DISCUSSION

Results of the present study revealed that there was a gradual increase in performance of static balance with increase of age from eight to twelve years for schoolgirls. But the yearly increase was statistically significant for nine to ten years and eleven to twelve years only. However, the increase in static balance might be due to increase in growth factors like body weight as explained by Nolan (2005). Increase in balance also might be due to improved sensory integration (Wool-lacott,1990), task specific use of different postural control strategies (Riach andStarkes, 1995) and progressive brain maturation (Lenroot andGiedd, 2006).

4 CONCLUSION

On the basis of results obtained the following conclusion were drawn with in the limitation of the study that Static balance increases with respect to age from 8-12 years for girls.

REFERENCES

[1]   Woollacott MH, Shumway-Cook A. Changes in posture control across the life span—a systems approach. Phys Ther. 1990;70(12):799–807. Epub 1990/12/01. [

[2]   Shumway-Cook A, Woollacott M. Motor control: translating research into clinical practice. Fifth Edition, international edition ed. Philadelphia: Wolters Kluwer; 2017.

[3]   Granacher U, Muehlbauer T, Gollhofer A, Kressig RW, Zahner L. An inter-generational approach in the promotion of balance and strength for fall prevention—a mini-review. Gerontology. 2011;57(4):304–15. Epub 2010/08/20. 10.1159/000320250.

[4]   Nolan L, Grigorenko A, Thorstensson A. Balance control: sex and age differences in 9- to 16-year-olds. Dev Med Child Neurol. 2005;47(7):449–54.

[5]   Riach CL, Hayes KC. Maturation of postural sway in young children. Dev Med Child Neurol. 1987;29(5):650–8.

[6]   Hirabayashi S, Iwasaki Y. Developmental perspective of sensory organization on postural control. Brain Dev. 1995;17(2):111–3.

[7]   Riach CL, Starkes JL. Velocity of centre of pressure excursions as an indicator of postural control systems in children Gait Posture. 1994;2(3):167–72.

[8]   Lenroot RK, Giedd JN. Brain development in children and adolescents: insights from anatomical magnetic resonance imaging. NeurosciBiobehav Rev. 2006;30(6):718–29. Epub 2006/08/05. 10.1016/j.neubiorev.2006.06.001.

[9]   Steindl R, Kunz K, Schrott-Fischer A, Scholtz AW. Effect of age and sex on maturation of sensory systems and balance control. Dev Med Child Neurol. 2006;48(6):477–82. 10.1017/S0012162206001022.