



Comparison of core muscle endurance and dynamic stability among private and government school going children

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ABSTRACT

Introduction: The core is a 3 dimensional space with muscular boundaries diaphragm superior, abdominal and oblique muscles (anterior –lateral) paraspinal ,gluteal muscles posterior and pelvic floor muscle ,hip girdle muscle inferior. The inherent nature of these muscle boundaries produces a corset like stabilization.

Core stabilization is the integration of the passive spinal column, active spinal muscles and the neural control unit, which when combined maintains the intervertebral range of motion within safe limit to enable activities to be carried out during daily living. ¹

Aim of Study-

To study comparison between core muscle endurance and dynamic stability among government and private school going children.

Methodology:- This is a comparative study and total 200 subject taken. Purpose and procedure of the study was explained to all the subjects. Subjects were divided into two groups – group 1 –government school going children’s. Group 2- private school going children’s Both groups subjects were assessed for core muscle endurance and dynamic stability.

Conclusion:- On the basics of above results, it can be concluded that government school children were better than private children on variables core muscle endurance and dynamic stability

Key Words:- Core muscle endurance, sphygmomanometer, Dynamic stability, Measuring tape

1. INTRODUCTION

The core is a 3 dimensional space with muscular boundaries diaphragm superior ,abdominal and oblique muscles (anterior –lateral) paraspinal ,gluteal muscles posterior and pelvic floor muscle ,hip girdle muscle inferior. The inherent nature of these muscle boundaries produces a corset like stabilization .

Core stabilization is the integration of the passive spinal column, active spinal muscles and the neural control unit, which when combined maintains the intervertebral range of motion within safe limit to enable activities to be carried out during daily living. Core stabilization includes 3 interdependent subsystem –passive, active, neural control.

Passive subsystem comprises the static tissues including vertebrae, intervertebral discs, ligament, joint capsule. The primary function of these static tissues is to stabilize in the end range of motion as tensile forces increases and mechanical resistance to movement produced. The active subsystem is consist of core musculature and provide dynamic stabilization to the spine and proximal appendicular skeleton.

The neural control subsystem is the centre for incoming and outgoing signals that ultimately produce and maintain core stability [Figure:-1].¹

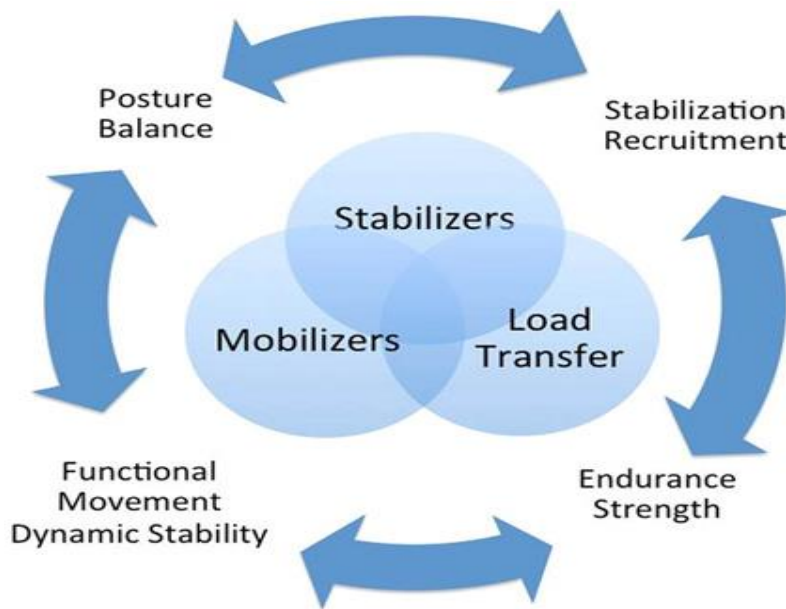


Figure:-1 Functional core stability. This figure illustrates the various components and roles that interact to achieve functional core stabilization.

Various researches have been done to find out the effect of weak core stability on low back and lower extremity . They concluded that compromised core stability creates an unstable proximal base, thus limiting control and positioning of lower extremity for functional movement .Increase loads on extremity ,increase injury risk.²

A study was done to find the relationship between trunk muscle endurance with static and dynamic balance in female collegiate students .sanjeet mandal et al. In his research concluded that there was a significant relationship between trunk muscle endurance and static and dynamic balance.³

Physical wellbeing in adulthood is largely the consequences of childhood fitness .The most critical place for attaining the physical fitness during childhood are schools.⁴

Various researches have been done on two platforms that is government school verses private schools. They have concluded that there is vast difference in socioeconomic characters of students which are due to teaching efforts, activity levels of students and other school inputs.⁵

As the prevalence rate of low back pain is higher so in this contact one research was done by ahmadi rahmat in which he has seen the effect of core stabilization exercises on physical fitness of children and concluded that core stability exercises appeared to be a viable and effective way to improve physical fitness capacity in children.⁶

Our main aim is to determine whether school environment plays any significant role by affecting core stability muscle endurance and dynamic stability in children.

Need of Study

To study whether different school environment can alter physical fitness of children

Aim of Study

To study comparison between core muscle endurance and dynamic stability among government and private school going children.

Research Hypothesis

Experimental Hypothesis

Experimental hypothesis- (e1)- government school going children may have better core muscle endurance and dynamic stability as compared to private school going children.

Experimental hypothesis- (e2)-private school going children may have better core muscle endurance and dynamic stability as compared to government school going children.

Alternate Hypothesis

Alternate hypothesis- Both government and private school going children may not have better core muscle endurance and dynamic stability.

2. REVIEW OF LITERATURE

MAITRI MODI, GEETA BHATT (2017)- conducted a study to check the effect of core stability training on dynamic balance and lower extremity performance in young asymptomatic individual. 40 young asymptomatic individuals were selected and pre training sessions were held for both the group in which limb length, core stability, dynamic balance using star excursion balance test and lower extremity t test of agility were assessed. The subjects in the experimental group had to undergo progressive core stability training program for 6 weeks and control group had to refrain from any form of core stability training for 6 weeks both group had to undergo post training session where

all parameters were assessed again. They concluded that core stability improves dynamic balance.⁷

SADAM HUSENEMAN VEENA PARIS (2017)- conducted a prospective study to find the relationship of several physical risk factors on the occurrence of low back pain over a period of 6 months among young sedentary individuals. In this study total 187 students with age group 18- 30 yrs. were taken with the international physical activity questionnaire score of less than 600 metabolic equivalent min/week were recruited through convince sampling participants were assessed for body mass index, hamstring and iliopsoas muscle tightness ,abdominal muscle strength and endurance they concluded that there is significant correlation between trunk flexion and extension range of motion abdominal muscle endurance obese overweight .category with low back pain among young sedentary individuals.⁸

GAGANDEEP SINGH, DR SUKHDE V SINGH (2017)- conducted a study to find out the difference of selected physical fitness variables between government and private school boys. A total of 384 school boys participated in the study. The variables selected in this study were speed, agility, balance, coordination and endurance. The purposive sampling technique was used to select the participant. They concluded that handgrip strength and endurance of government school boys were found to be significant than private schools.⁹

ANOLIH.JOBALI, SUPRIYA JOHN (2017)– conducted a correlation study to determine the correlation between the two parameters transverse abdominis muscle endurance and limit of stability. 100 asymptomatic healthy nulliparous urban women of age 18-25 years ago with body mass index 18.5 -27.9 kg/m square were included in the study. Participants performed two test in random order prone test for transverse abdominis muscle endurance using pressure biofeedback unit and limit of stability using the neuroma balance manager. They concluded that there is positive correlation between transverse abdominis muscle and limit of stability.¹⁰

SANJIT MANDAL, BIDYA ROY (2017)– conducted a study to assess the relationship between trunk muscle endurance with static and dynamic balance in female college students 33 female students of west Bengal age 21 Tooked part in the study. In first phase static balance was measured using a quantifiable clinical test called single leg stance test. dynamic balance was measured using star excursion balance test. Trunk muscle endurance was assessed using soreness test of trunk extensor endurance test. They concluded that there is significant relationship of trunk muscle endurance with static and dynamic balance in female college students.¹¹

DR PRACHI. KAPDULE (2017)–conducted a study on 110 young individuals by distributing an International physical activity questionnaire to determine the level of physical activity. core stability was measured by using pressure biofeedback unit and graded using Sharman core stability test. They concluded that there was significant association between core stability and physical activity in young adults.¹²

SAYA SHIRANATA (2017). conducted a study to investigate the effect of core strength training on core stability with and without the Valsalva maneuver. 24 students were randomly assigned to the training and control groups. students in the training group undertook a 4-week training program that included exercises for the transverse abdominis multifidus, pelvic floor. were students in the control group performed their usual activities. Participants were required to perform 4 types of task with without Valsalva maneuver and then they conclude that core stability of participants improved after performing 4-week strength training program.¹³

ALEX.J.Y.LEE (2016) –conducted a study to evaluate the effects of core stability training on dynamic balance in healthy young students 24 healthy collegiate female students participated in the study they underwent a series of core stability exercise. Ninety minutes, twice per week for six weeks. Dynamic balance was evaluated using limit of stability test. They concluded that regular core stability training can improve the dynamic postural stability in healthy young students.¹⁴

JORG SCELLBACH, URS GRANACHE (2014)- conducted a randomized controlled study to investigate the effect of core strength training performed on stable surface compared to unstable surface on physical fitness in school aged children. 27 healthy subjects were randomly assigned to core strength training using unstable surface or core strength training using stable surface both training programs lasted 6 weeks 2 session weeks were included different core exercises. during core stability training on unstable surface these exercise was conducted on unstable surface they concluded that core strength training result in significant increase in proxies of physical fitness adolescent however as compared to core stability training on stable surface has only limited additional effects.¹⁵

AHMADI RAHMAT, HIDAR (2014)- conducted a study to determine the effect of core stability exercises program on physical fitness of children aged between 9-12 years Subject were divided into two groups training group and control group. Training group performed a core stabilization program for 6 weeks ,3 sessions per week. Pre and posttest measurement were taken. They concluded that core stability exercises appear to be a viable and effective way to improve fitness capacity.¹⁶

LEWISE, OLIVER –B (2013)- conducted a study to investigate the association between adolescent low back pain, trunk muscle endurance and poor limbo pelvic stability .80 adolescent in grade 8 and in grade 11, aged 12to 17 years participated in the study. Data was collected using validated questionnaire and physical test. The active straight leg raise test was used to record the limbo pelvic stabilizing muscles. side bridge test was used to measure trunk flexor and extensor muscle endurance. They concluded that there was association between trunk muscle endurance and adolescent low back pain and lumbopelvic stability.¹⁷

SAHA GC , HALDAR S (2012)-conducted a study to compare health related physical fitness variables and psychomotor ability between rural and urban school going children

.1000 students participated in the study age ranging between 17-30 years .(500 tribal and 500 non tribal)lower back flexibility ,cardiovascular function ,abdominal strength was measured .They concluded that there is significant difference between rural and urban school going children .And results shows that rural school going children were better than urban.¹⁸

TOMOKO OKADA, KELLIE C. HUXEL (2010), conducted a study to determine relationship between core stability, functional movement and performance .28 healthy individual participated in the study they performed core stability test, functional movement screen test, rotatory stability and performance test. They concluded on the basis of above test score. There is significant relationship between core stability and functional movement.¹⁹

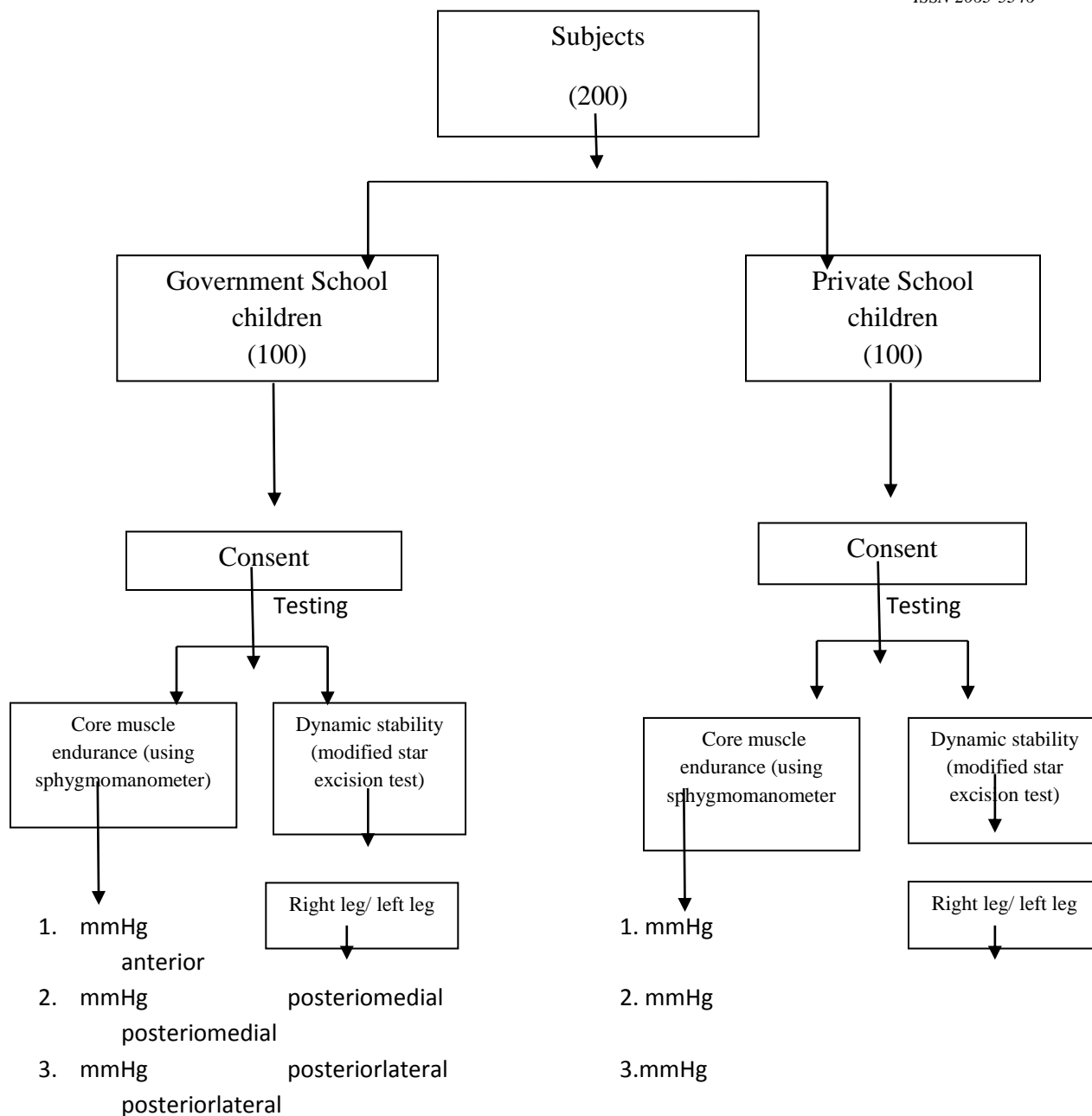
HAZHEER RASIF (2007) conducted a study to investigate the effects of physical activity and body composition, gender on core muscle function and gender and age related differences .98 young adults age 18-30 participated in the study. Body composition variables such as height, weight, subcutaneous fat mass, length of time holding, front bridge, side bridge were recorded. As measure of core muscle function. standing long jump distance was recorded as lower limb muscle function. They concluded that young men have better core and lower limb muscle function compare to women.²⁰

JJ SALMINEN (1993) conducted a study to analyze whether a low frequency of leisure time physical activity correlate with an increased occurrence of low back pain with decreased spinal mobility and diminished trunk muscle strength .38 (15 years) old children reporting recurrent or continuous low back pain and 38 asymptomatic control group. were compared with respect to spinal mobility and trunk muscle strength. The subjects were interviewed on leisure time physical activity preceding the measurement. The subjects of both the group pursued some physical activity two days a week or less. They concluded that a very low frequency of physical in young might be the risk factor of low back pain.²

3. METHODOLOGY

In this study simple random sampling technique was used. It is a comparative study & total 200 subjects has selected for research and its study duration are 2 days. These subjects were solicited from the Government Inter college Badowala jolly grant Dehradun & Doon public school Bhaniyawala and selected according to inclusion and exclusion criteria. Inclusion Criteria:- Government school going children age >14 years <or equal 18 years Private school going children age >14 years <or equal to 18 years. Exclusion Criteria:- Age more than 18 years, Fracture, Neurological disorders. Outcome measure:- Modified star excursion test & Core muscle endurance measurement using sphygmomanometer. Instrumentation- Measuring tape, Marker & Sphygmomanometer.

Procedure:-



Purpose and procedure of the study was explained to the school authority and permission was taken from the authority regarding the study. The subjects were screened according to inclusion and exclusion criteria. And a written consent form was given to the subjects which was filled by their parents. Purpose and procedure of the study was explained to all the subjects.

Subjects were divided into two groups – group 1 –government school going children’s Group 2- private school going children’s Both groups subjects were assessed for core muscle endurance and dynamic stability.

Measurement of core muscle endurance using sphygmomanometer-

Position of the subject- The subject was made to lie in supine on the couch and the cuff of the sphygmomanometer was inflated which was placed under the corresponding L3 and L4 vertebrae. The subject was given the command to flex both the knees at 90-degree flexion.

Procedure- The demonstration of the whole procedure was given by the therapist itself to make the subjects understand the procedure easily.

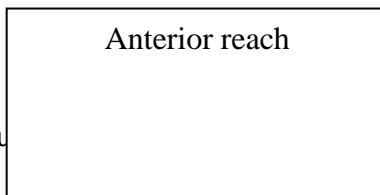
A cuff was placed under the L3, L4 vertebrae with the subject in supine position knees were bent at 90 degree of flexion. Before performing abdominal drawing in maneuver, the cuff was inflated to 40 mm hg of pressure and this was maintained while subjects was instructed to perform the abdominal drawing in maneuver. All the subject was told to press the inflated cuff with their lower back with maximum effort as by this we were targeting to increase the maintained pressure of 40 mm hg. The subjects were asked to hold the increased pressure for 10 secs and then relax. At the time they relax reading was noted. And the same procedure was repeated two more times to calculate the mean value [Figure 3.1].



Figure 3.1 Measurement of core muscle endurance using sphygmomanometer-

Reading	mmHg
1	
2	
3	

Measurement of Dynamic stability using Modified star excursion test-



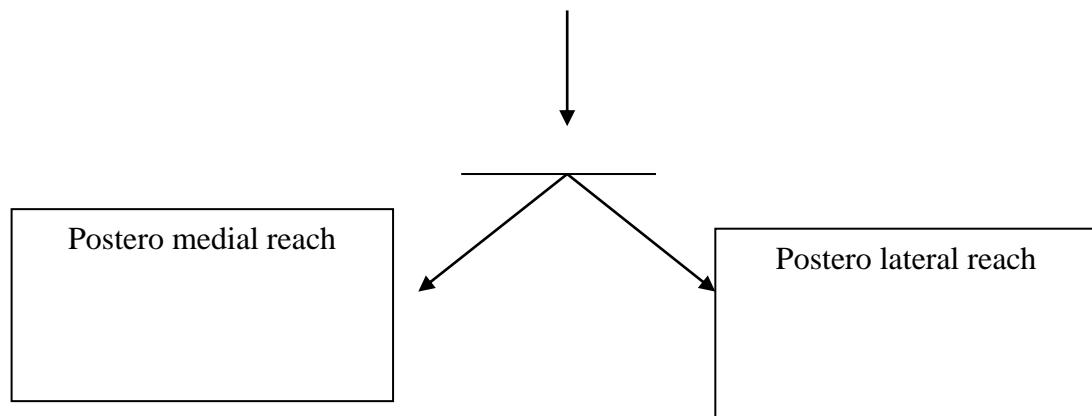
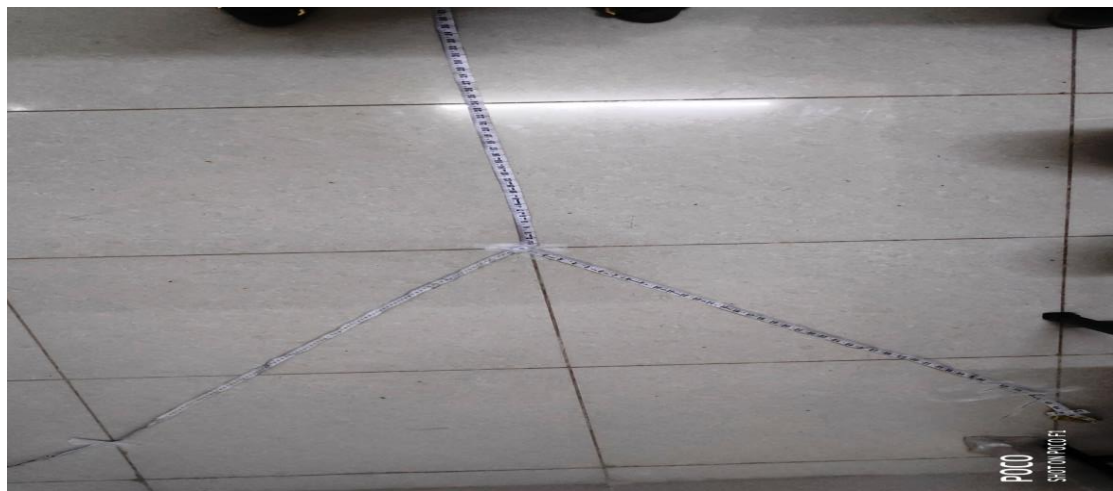


figure 4.2 testing room



Position of the subject- The subjects were told to stand with barefoot in the Centre of grid which was already laid by the therapist on the floor. With 3 lines extending at 135 degrees and 90-degree angulation from the Centre of grid. The subject was told to keep both the hands on hip.

Procedure- The demonstration of the whole procedure was given by the therapist itself to make the subject understand the procedure easily. The subjects were asked to stand with right leg on the Centre of the grid and while with the left leg subject was told to reach the marked distance made on the floor in the posterior medial, posterior lateral and anterior direction as far as possible along the chosen line. The maximal reach distance was recorded and noted and the same procedure repeated 2 more times [Figure 3.3].



Figure 3.3 Measurement of Dynamic stability using Modified star excursion test-
The same procedure was repeated by right leg and for that also 3 readings were taken

Sr. no	Anterior	Posteromedial	Posterolateral
1			
2			
3			

and mean was calculated.

4. RESULTS

Statics were performed by using graph pad in software. Results were calculated by using 0.05 level of significance. Independent t-test was used to analyze and compare the scores. Result of our clinical study are presented as comparison of Group 1 (government school going children) Group 2 (private school going children).

Table 4.1 comparison between Group 1 and Group 2 on the bases of core muscle endurance having mean \pm SD of group 1 (79.09 \pm 21.411) and group 2 (65.75 \pm 18.732) the p value is 0.04. hence the result is significant.

Variables	Group-1 mean \pm SD	Group-2 mean \pm SD	P Value
CORE	79.09 \pm 21.411	65.75 \pm 18.732	0.043

Table 4.2 comparison between Group 1 and Group 2 on the bases of anterior right leg component of dynamic stability having mean \pm SD of group 1 (27.02 \pm 4.966) and group 2 (25.39 \pm 4.811) the p value is 0.557. hence the result is not significant.

Variables	Group-1 mean \pm SD	Group-2 mean \pm SD	P Value
<i>Anterior R</i>	27.02 \pm 4.966	25.39 \pm 4.811	0.557

Table 4.3 comparison between Group 1 and Group 2 on the bases of posterior medial right leg component of dynamic stability having mean \pm SD of group 1 (28.43 \pm 5.886) and group 2 (28.29 \pm 6.046) the p value is 0.198. hence the result is not significant

Variables	Group-1 mean \pm SD	Group-2 mean \pm SD	P Value
<i>Posterior MR</i>	28.43 \pm 5.886	28.29 \pm 6.046	0.198

Table 4.4 comparison between Group 1 and Group 2 on the bases of posterior lateral right leg component of dynamic stability having mean \pm SD of group 1 (27.52 \pm 7.514) and group 2 (26.72 \pm 6.239) the p value is 0.198. hence the result is not significant.

Variables	Group-1 mean \pm SD	Group-2 mean \pm SD	P Value
<i>Posterior L</i>	27.52 \pm 7.514	26.72 \pm 6.239	0.55

Table 4.5 comparison between Group 1 and Group 2 on the bases of anterior left leg component of dynamic stability having mean \pm SD of group 1 (27.81 \pm 4.272) and group 2 (25.59 \pm 6.410) the p value is 0. hence the result is significant.

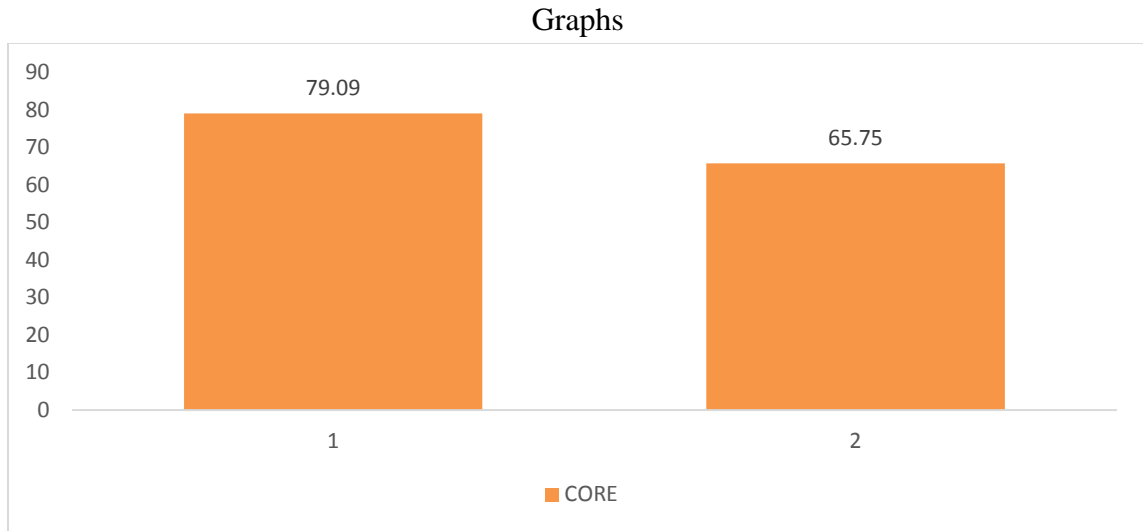
Variables	Group-1 mean \pm SD	Group-2 mean \pm SD	P Value
<i>Anterior L</i>	27.81 \pm 4.272	25.59 \pm 6.410	0

Table 4.6 comparison between Group 1 and Group 2 on the bases of posterior medial left leg component of dynamic stability having mean \pm SD of group 1 (27.83 \pm 5.274) and group 2 (29.13 \pm 5.963) the p value is 0.048. hence the result is significant.

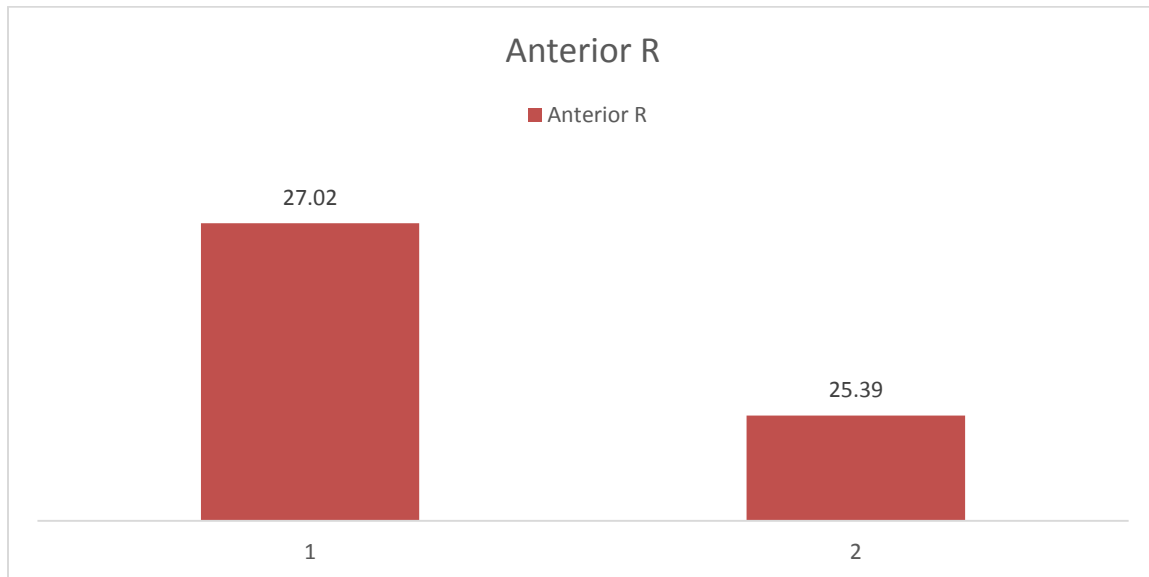
Variables	Group-1 mean \pm SD	Group-2 mean \pm SD	P Value
<i>Posterior (M) L</i>	27.83 \pm 5.274	29.13 \pm 5.963	0.048

Table 4.7 comparison between Group 1 and Group 2 on the bases of posterior lateral left leg component of dynamic stability having mean \pm SD of group 1 (28.92 \pm 6.102) and group 2 (27.95 \pm 7.613) the p value is 0.198. hence the result is significant.

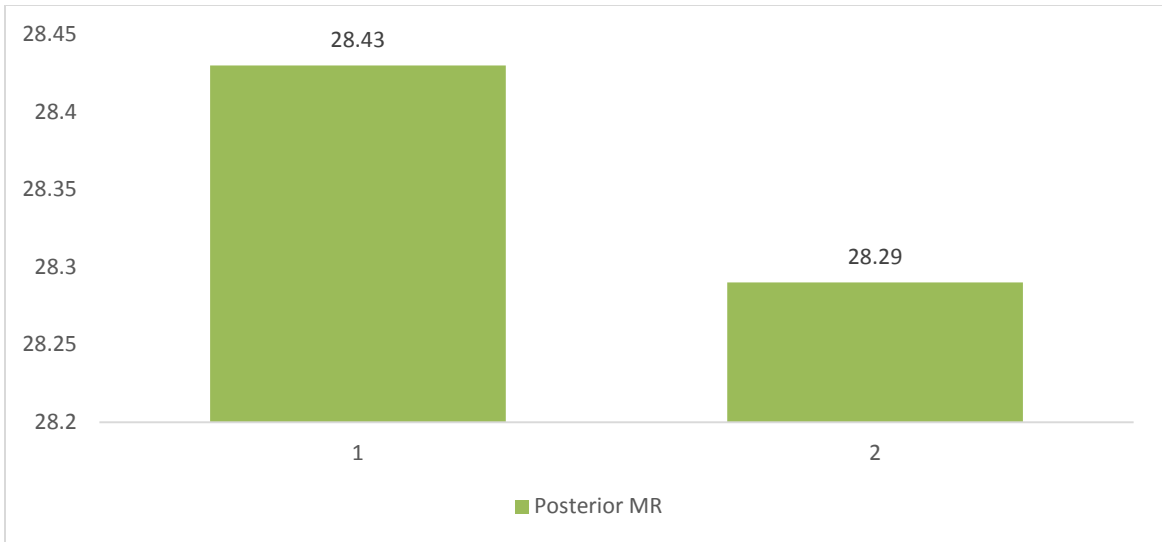
Variables	Group-1 mean \pm SD	Group-2 mean \pm SD	P Value
<i>Posterior L</i>	28.92 \pm 6.102	27.95 \pm 7.613	0.006



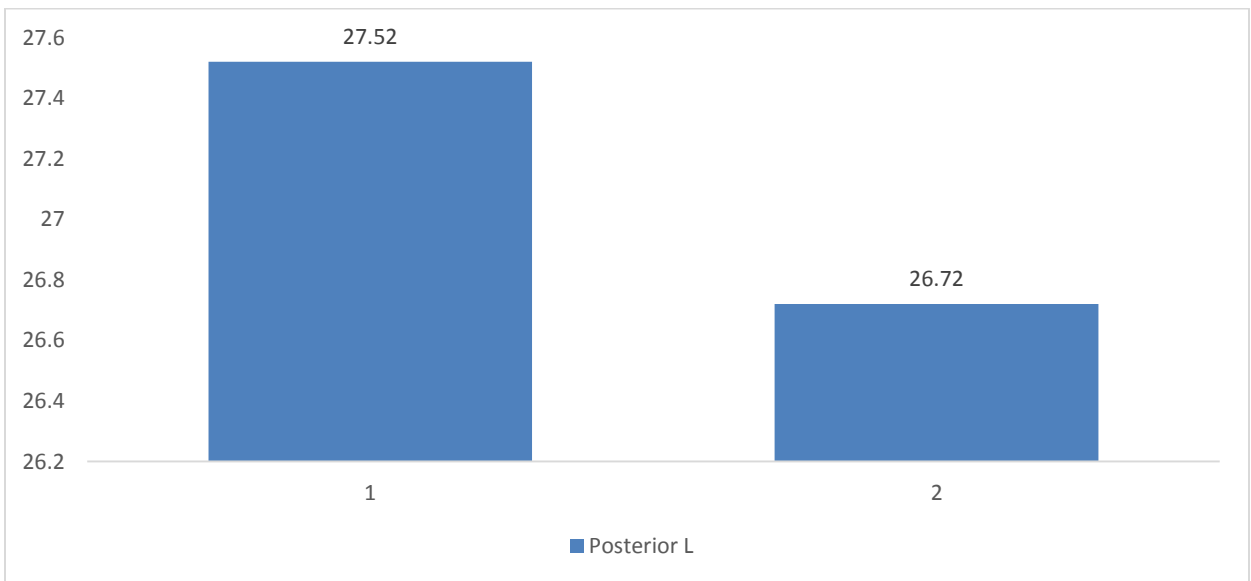
Graph 4.1 showing mean, standard deviation, p value for core muscle endurance of government and private school going children



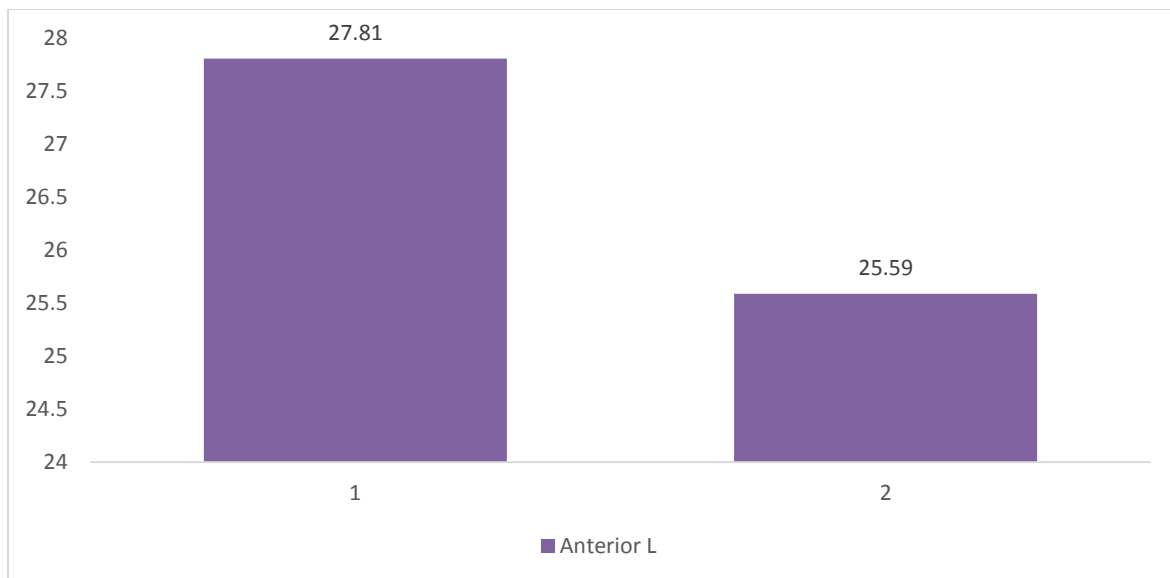
Graph 4.2 showing mean standard deviation, p value, of anterior right leg component of dynamic stability of government and private school going children



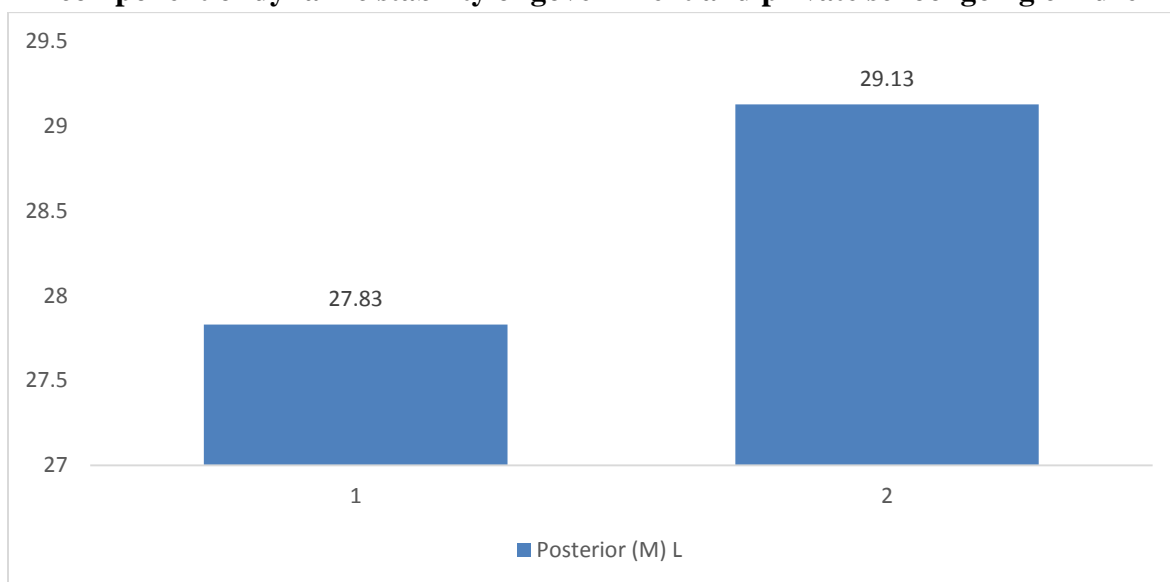
Graph 4.3 showing mean, standard deviation value of posterior medial right leg component of dynamic stability of government and private school going children



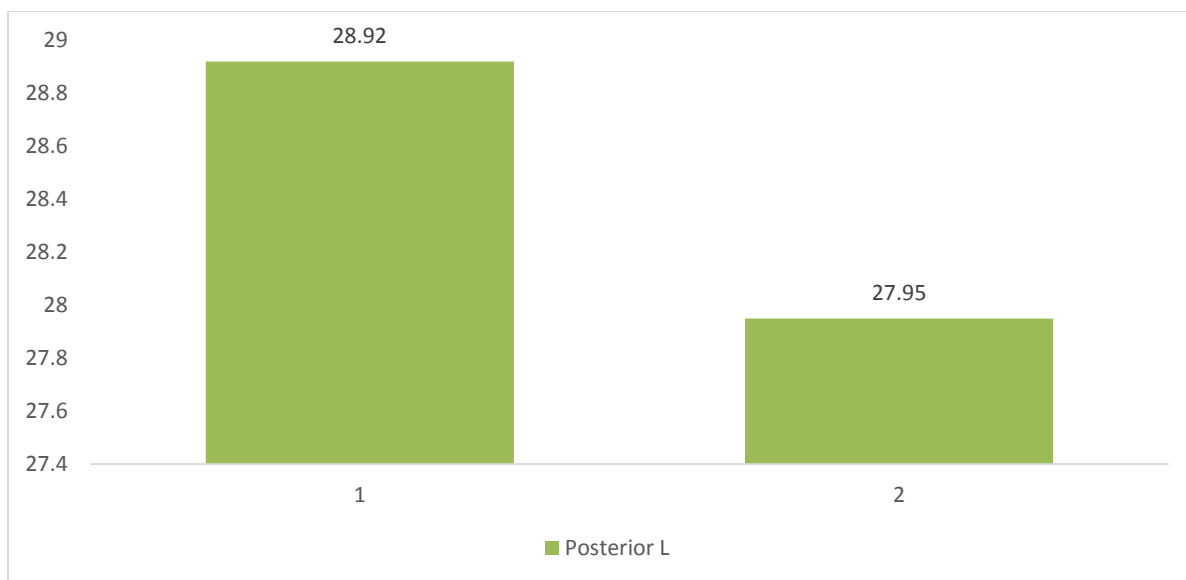
Graph 4.4 showing mean, standard deviation, value of posterior lateral right leg component of dynamic stability of government and private school going children



Graph 4.5 showing mean, standard deviation, p value of anterior left leg component of dynamic stability of government and private school going children



Graph 4.6 showing mean, standard deviation value of posterior medial left leg component of dynamic stability of government and private school going children



Graph 4.7 showing mean ,standard deviation, p value of posterior lateral left leg component of dynamic stability of government and private school going children

DISCUSSION

The present study was intended to explore the difference of core muscle endurance and dynamic stability between private and government school going children. The comparison was done between private and government school going children age group of 14-18 years on 200 overall sample size .It was found that there is significant difference between variables like core muscle endurance,(anterior left leg ,poster medial left leg ,posterior left leg) component of dynamic stability between government and private school going children .But there was no significant difference between (anterior right leg,posteriomedial right leg ,posteriolateral right leg)component of dynamic stability.

The reason behind why government school children core muscle endurance better than private school children- In India majority of students enrolled in government school are usually from low socioeconomic status and students with higher socioeconomic status usually go to private schools .The cause behind the finding might be sedentary lifestyle habit prevailed among higher socioeconomic status children on the other hand children with less socioeconomic status are likely to expose to those work which demands more physical activity .

The reason behind why there is no significant difference between few component of dynamic stability can be due to obesity which play a greater role or it can be due to muscular imbalance.

LIMITATION OF STUDY

Groups can be further categorized on the basis of body mass index, involvement in sporting activities.

FUTURE STUDY

Study can be done on large sample size. Biomechanical analysis could also be done to find the exact cause why in few component of dynamic stability there is no difference.

CONCLUSION

On the basis of above results, it can be concluded that government school children were better than private children on variables core muscle endurance and dynamic stability

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