An Experimental Study On Effects Of Chaturanga Dandasana On Lumbopelvic Stability In Young Girls

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Abstracts: Background: Chaturangadandasana is a part of ashtanga yoga, which helps to improve core muscle strength, endurance and overall stability of lumbopelvic region, although there is little scientific evidence that describes its efficacy. Methodology**:** A randomized control trial was conducted. The study was done in various colleges of Ahmedabad. Thirty six young healthy girls participated in this study. The participants were randomly allocated to A and B groups: Chaturangadandasana group (n=18) and control group (n=18). The participants of both group attended 12 sessions over a period of 3 weeks. The outcome was lumbopelvic stability; tests were performed on pretreatment and after 6th and 12th sessions.Results: After 6 and 12 sessions there were significant improvement in both group in case of within group analysis and in case of between group analysis, improvement was marked significantly in chaturangadandasana group. Conclusion**:** Chaturangadandasana is the much more beneficial to improve lumbopelvic stability in young girls and by this, it can prevent future back pain in the young girls. [Shah J NJIRM 2015; 6(2):70-74]

Key Words: Chaturangadandasana, lumbopelvic stability.

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Introduction: Segmental stability and mobility control of the core body (i.e., lumbo-pelvic control) as well as flexibility of the body parts accentuate peak performance and prevent musculoskeletal injury. Improper activation and poor control of deep trunk muscles (i.e., TrA, MF) exist in asymptomatic individuals showing inability to control lumbo-pelvic stability, which is the early detecting sign for the back problems.

Remarkably, the dysfunction and delayed onset of TrA and atrophy of MF appear in people with low back pain. Consequently, CNS is not able to control these muscles in feed-forward manner. These changes cause instability of the spine. In addition to repetitive contraction, muscles will generate pulling stress upon the proximal attachments during movement which affects directly joints and soft tissues surrounding the spine as a result of strain and degeneration.[1]

Also “proximal stability for distal mobility”, a well-known phase is an underlying principle of intervention with therapeutic exercises.[2]

Good core stability helps an individual perform better and effectively, as a good core provides a more stable base for arm and leg movements, improving the control and quality of movements. It will improve the muscular co-ordination during movement. It will provide more support for the back and may reduce the risk of back injuries[2,3]

The reason for this is that the trunk muscles not only act as a prime movers or as antagonists to movement caused by gravity during the dynamic activity, they are important stabilizers of spine.[4,5]Studies have shown that deep fibers of multifidus and transverse abdominis are first to activate when there is rapid postural disturbance from rapid extremity movement[6,7]

Though there is lack of current information of the relationship between the two muscles, it is unknown if there is a relationship between the results of muscle tests of the Transverse abdominis and multifidus muscles and other clinical measures.[8] Individuals with acute and chronic low back pain(CLBP) show changes in trunk muscle activity , particularly in the transverse abdominis and multifidius[9]

Chaturangadandasana (Figure 1), which also known as four limb staff poses, is a type of yoga which focuses on core muscles of the body. Here, chatur means four, Anga means a limb or a part thereof, and danda means a staff. As name suggests, in this aasana body maintains on all four limbs (both palms and fore feet). So that will activate all core

muscles which helps in increasing lumbopelvic stability.[10]

Fig. 1 : Chaturangadandasana

In traditional yoga studies, the framework for yoga begins with the yamas (external restraints) and niyamas (internal observances). In ChaturangaDandasana, yamas can be understood as the skeletal shape and muscular stability of the pose and Niyamas on the other hand, can offer insight into the internal movements within the static pose.[11]

In addition to this, according to the result of pilot study on lumbopelvic level of 94 healthy young individuals shows that, in sedentary individuals very less number of individuals only 12 passed that stability test. This instability and poor muscle contraction may lead to back pain in future. Pain is because of the poor muscular support and a sustained load on the inert supporting tissues, it results in creep and distention which causes mechanical stress. In addition, injuries occur more frequently after a lot of repetitive activity or long periods of work and play when there is muscle fatigue.

So to avoid future back pain, stability and flexibility of lumbo pelvic is essential. That's why to prevention and rehabilitation of back injuries, it is essential to find the effects of new techniques, so here is a **need of study** for this.Also it helps for mental relaxation due to incorporation of breathing and very less no studies occur on chaturangadanadasana for core stability.

Materials and methods: This study was conducted in various colleges of Ahmedabad by randomized control trial. Randomized control trial was carried out. The inclusion and exclusion criteria of the study were as follows.

Inclusion criteria: Young adult female having normal BMI. (18 to 24)

- Female with the age group of 18-25 years.
- Person who is not engaged in sports activity more than twice in a week for 20 mins.
- Person who did not perform yoga before.

Exclusion criteria:

- Person having any kind of back pain more than twice a month.
- Engaged with regular sports activity more than twice a week and for longer duration
- Doing regular gym work
- Any associated health problem
- Pregnancy
- Any resent surgery
- Any injury to shoulder, elbow or wrist joint
- Mental disorders
- BMI less than 18 and more than 24

Randomization – sequence generation:
Simple randomization was conducted using Microsoft Excel for Windows Software by a researcher who was not involved in participant recruitment.

Allocation concealment:
It was done by one of the authors who were not involved with participant recruitment and treatment. Allocation was done by using consecutively numbered, sealed, opaque envelops. After the baseline assessment, the eligible participants were divided in to 2 groups. 36 numbers of female volunteers were randomly divided into chaturangadandasana and the control groups as 18- 18 each.

Interventions:
Group Achaturangadandasana group: This group attended 30 minutes training sessions, 5 times per week, for 12 sessions.Outcome measures using a standard core stability tests respectively at 0, 6 and 12th session of the study and overall lumbo pelvic tests are performed on 0th and 12thday.Warm up for 10 min in the form of generalized all join active movements. Then, in 15 min were allocated for chaturangadandasana. In this, aasana for 30sec hold for 5 times to gradually increase with 30sec hold for 9 times with rest period between it. After

that 5 min cool down in the form of complete relaxation on verbal commands

Group B control group: The control group attended generalized exercise session (SHAM) in the form of exercise of back and abdominal muscles for 30 minutes.At the end of 12th class awareness of chaturangadandasana and its benefits are done.All tests are performed same as group A. In this, Warm up for 10 min in the form of generalized all join active movements, 15 min generalized exs for back and abdominals.In this, isometric abdominal, isometric back extensors and bridging is given starting from 3 sets to increase with 5 sets. (1 set = 10sec hold for 10 repetitions) and 5 min cool down in the form of complete relaxation on verbal commands.

Outcome measures for both are:
Test using Pressure biofeedback unit (method: Harrington and Davies) [12]
Tests of core stability:

- Prone plank test
- Right side plank test
- Left plank test
- Flexure and extensor endurance test

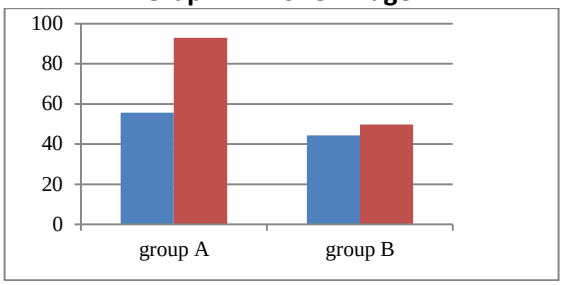
Results: Data analysis is done with the use of SPSS 20 software.33 final subjects (details are in Table 1) are analyzed in within group(according to non-parametric test) and between group results(according to parametric individual t test) for all core muscle tests. Overall stability is measured between groups using exact chi square tests.

Table 1

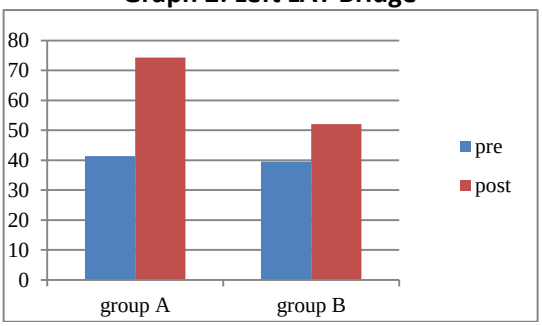
	Group A	Group B
Mean age	19.352	19.68
Standard deviation age	0.88	1.56
Mean height	151.52	156.93
SD height	4.799	6.35
Mean weight	46.88	47.68
SD weight	6.40	7.96
Mean BMI	20.40	19.46

Within group analysis: Non parametric related samples Friedman's test: There is statistically improvement in both group in all tests when it is compared within the group at p is less than 0.05 at level of significance is 0.05. (Graph 1 to 5)

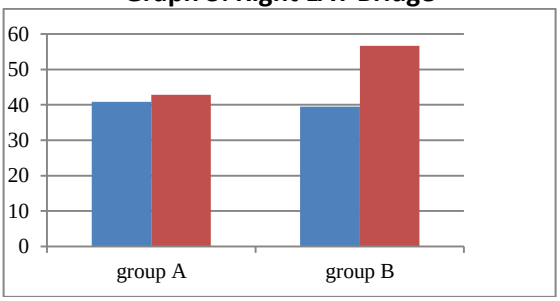
Graph 1: Prone Bridge.



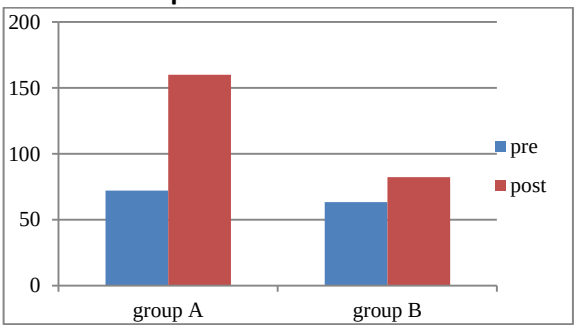
Graph 2: Left LAT Bridge



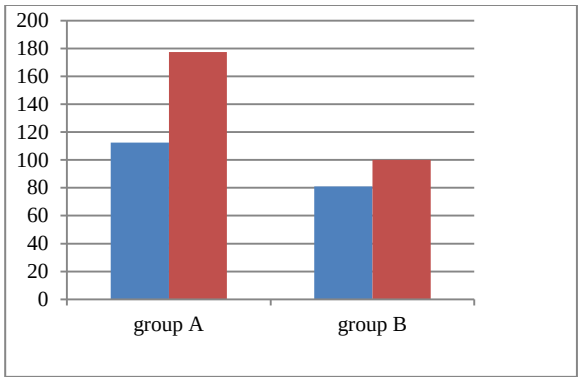
Graph 3: Right LAT Bridge



Graph 4: Flexor Endurance



Graph 5: Extensor Endurance



Between group analysis : Parametric individual t test is used in this analysis. It shows the results that group A is significantly better in all tests. (Table 2 to 6), (graph 6)

Table 2 : Rt lat plank test

	N	Mean	SD	t value	p
A	17	28.58	16.56	3.36	0.003
B	16	13.75	7.27		

Table 3: Prone plank test

	N	Mean	SD	t value	p
A	17	37.29	20.56	4.53	0.001
B	16	12.81	8.30		

Table 4 : Lt lat plank test

	N	Mean	SD	t value	p
A	17	32.88	16.23	4.81	0.001
B	16	12.56	6.10		

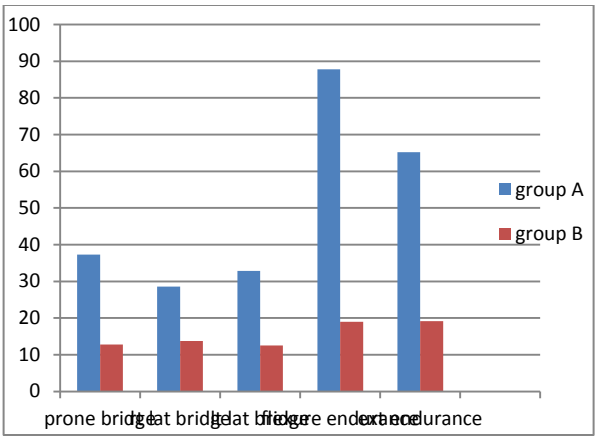
Table 5: Flexor Endurance test

	N	Mean	SD	t value	p
A	17	65.17	41.96	4.07	0.002
B	16	19.12	19.59		

Table 6: Extensor endurance test

	N	Mean	SD	t value	p
A	17	87.76	55.21	5.01	<0.001
B	16	19	11.98		

Graph 6: Improvement of stability after 12 sessions



For overall stability

In this biofeedback unit is used with the help of above mentioned method. (result table 7 shows number of candidate who pass the test, graph 7) And exact chi square test is used. According to that group A is highly significant. (value= 33.47 and $p < 0.01$).

Table 7

Interval	Group A	Group B
Pre	0	0
Post	14	2

Discussion: The finding of the study shows marked improvement in all tests of core stability in group A. It can be due to its pose in which all global as well as local core contracts concentrically, ecocentrically and co contraction, which helps to increase in strength, endurance and neural control. In second group, improvement in within group analysis can be due to the generalized activity which involves strengthening exercise of trunk and abdominals.Generalized activity which involves strengthening exercise of trunk and abdominals.

The concept of chaturangadandasana focuses on core or powerhouse and breath control that activates local muscles, especially transversusabdominis, internal oblique, diaphragm, lumbarmultifidus and pelvic floor muscles. Currently, scientific data show that these muscles have primary role in stabilizing the lumbo-pelvic system [13,14,15] The stability of lumbopelvic system is also dependent on the central nervous system to determine the requirements of stability by pre-programmed TrA contraction to stabilize the spine prior to trunk perturbation from limbs movement and external load to the body's parts[13]

By this method CNS may enhance the control of the spine when the trunk is challenged by internal and external forces.

Conclusion: According to the above results we can reject null hypothesis and accept alternative one. So conclusion can be, Group A chaturangadandasana is significantly better than generalized exercise group to improve lumbo pelvic stability in young girls.

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