

## **“Diagonal Dynamic Balance Test for West Bengal Secondary School Students”**

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### **ABSTRACT**

*In Biomechanics, Balance is an ability to maintain the line of gravity (vertical line from center of mass) of a body within the base of support with minimal postural sway. Sway is the horizontal movement of the centre of gravity even when a person is standing still. Maintain balance requires coordination of input from multiple sensory organs including the vestibular, somatosensory, and visual systems (<https://en.wikipedia.org/wiki/balance>)*

*There are two types of balance commonly use in physical education and sports- Static & Dynamic. In humans, both types of balance are necessary to ensure an active lifestyle and also during sports performance. ([www.healthyliving.azcentral.com](http://www.healthyliving.azcentral.com))*

*Purpose of the study was to construct a dynamic balance test for West Bengal secondary school students.*

**Subjects:** School going students. Age Level: 10 to 14 (Class V to VIII). Sex: For boys and girls.

**Equipments:** Lime dust/color paint, non-slip floor or mat at least 3x1.75 mt, stopwatch, measuring tape. (Marking can made on flex also)

### **Test Administration:**

- A demonstration of the test was given. Then the tester repeated the instructions.
- On the command ‘ready’, the subject is asked to stand behind the starting line on left foot.
- On the signal ‘go’ the subject had to jump by left leg and landed with right leg on the middle of box marked as ‘R’ as per direction gave by arrow mark in the picture.
- After landing subject is required to maintain a steady position on toe (by raised heel) up to maximum five seconds.
- After five seconds there was command ‘next’, then the subject jumped with right leg and landed on ‘L’ marked area on left foot and stay for another five seconds on left toe.
- Subject is asked to repeat the processes till the last box come.

**Score:** Three trials were given and the average was considered as the final score.

### **Conclusions:**

On the basis of the above discussions the following conclusion has been drawn:

- This test is applicable for 10-14 years of West Bengal secondary school students.
- It is economic and less time consuming.
- The measurement feasibility of this test was more than other dynamic balance tests.

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**Keywords:** *Balance, Static balance & Dynamic balance, Test.*

## **INTRODUCTION:**

Balance is considered as a component of skill related fitness. Balance is an important aspect of games and sports. The ability to maintain an upright posture while still or moving. According to USDHHS Balance is “maintenance of equilibrium while stationary or moving”. In Biomechanics, Balance is an ability to maintain the line of gravity (vertical line from center of mass) of a body within the base of support with minimal postural sway. Sway is the horizontal movement of the centre of gravity even when a person is standing still. Maintain balance requires coordination of input from multiple sensory organs including the vestibular, somatosensory, and visual systems. (<https://en.wikipedia.org/wiki/balance>)

There are two types of balance commonly use in physical education and sports. These are static and dynamic balance. Static balance may be defined as the physical ability that enables holding of stationery position, it happens when the object's centre of gravity is on the axis of rotation. Dynamic balance, on the other hand is the ability to maintain balance during motion or switching between positions. In humans, both types of balance are necessary to ensure an active lifestyle and also during sports performance. ([www.healthyliving.azcentral.com](http://www.healthyliving.azcentral.com))

Fatigue, age, gender, height have all been shown to impact an individual's ability to balance and the assessment of that balance. (Hagman et al., 1995)

## **Background of Balance Test:**

Tests are the roots of evaluation and provide the means to be used for obtaining measurements. Tests are very important for achieving objectives. Tests are the foundation to all measurements, evaluations, selections, monitoring, training, teaching and treatments (Kansal, 2012).

Balance is a basic performance test of Physical performance Test. For measuring balance there are so many tests are commonly used. These are:

**Balance Rail:** the purpose of this measuring instrument was to estimate the student's ability to maintain a balance position on one foot on a rail. Construct validity was used in developing the measuring instrument, and attest-retest reliability of 0.82 was obtained (Johnson & Nelson, 1979; Verducci, 1980).

### **Stork stand test:**

Objectives: to measure static balance on the ball of the foot of the dominant leg. Age Level: 10 to College age, Sex: for both Boys and Girls, Reliability: an r of 0.87 was found, Validity: face validity is accepted for this test (Johnson & Nelson, 1986; Kansal, 2012).

### **Bass Stick test (lengthwise & Crosswise):**

Objectives: to measure static balance on a narrow surface on the ball of the foot. Age Level: 10 to College, Sex: for both Boys & Girls, Reliability: an r was found 0.90, Validity: face validity is accepted for this test (Johnson & Nelson, 1986).

### **Progressive Inverted Balance Test (long form and short form) (Johnson):**

Objectives: to measure the ability to balance in an inverted position these tests were probably most appropriate for gymnastics unit or self-testing activities unit. Age Level: 9 to College, Sex: for both Boys & Girls, Reliability: an  $r$  was found 0.82, Validity: face validity is accepted for this test (Johnson & Nelson, 1986).

Beam walk/Balance beam,  
Balance board test,  
Standing Balance test,

**Balance Challenger Tests (Johnson 1979):** Objectives: to measure balance in various positions with the Balance Challenger (or Levelometer Board). The Balance Challenger is relatively inexpensive (Johnson & Nelson 1986).

### **Modified Bass Test of dynamic Balance:**

Objectives: to measure the ability to jump accuracy and maintain balance during movement and after movement. Age level: age high school and College age. Sex: for both boys and girls. Reliability: an  $r$  of .75 was found for this test when subjects were tested on separate days. Validity: an  $r$  of .46 was found when this test was correlated with the Bass test of dynamic balance (Johnson & Nelson 1986).

### **Nelson Balance Beam Test:**

Objectives: to measure both static and dynamic balance in a single test. Age level: age 9 through College age. Sex: for both boys and girls. Reliability: test-retest coefficients of 0.91, 0.90, and 0.68 were found for fourth, fifth, and sixth grade boys respectively. Validity: the test had face validity as a measure of balance and  $r$  value was found 0.77 (Nelson and Johnson 1986).

**Star Excursion balance Test (SEBT):** is a dynamic test that requires strength, flexibility, & proprioception.

- For physically active people
- Is a reliable and valid test to predict risk of lower extremity injury
- This test is a screening tool for sport participants as well as a post-rehabilitation to ensure dynamic functional symmetry.

(Journal of Athletic training, 2012)

But the researcher can't select any of the above mentioned tests, due to conversion administrative and scoring process. Keeping all this view in mind the researcher has tried to construct a new dynamic balance test.

## **DYNAMIC BALANCE TEST MANUAL**

**Purpose:** To construct a dynamic balance test for school students.

**Subjects:** School going students

**Age Level:** 10 to 14 (Class V to VIII).

**Sex:** For boys and girls.

**Validity:** Face validity has been established by the expert opinion. Three Physical Education experts opinion has been collected. And the concurrent validity of the test has been established through parallel form test. First test was conducted on 125 subjects and the newly

constructed test also applied on the same population. The co-efficient of correlation between two tests was observed highly positive and the r-value was found to be 0.804.

**Reliability:** The reliability of this test was observed through test-retest method. At first the test was conducted on 125 students and next day the same was applied on the same subjects and all others conditions were remain same. The co-efficient of correlation were found to be 0.845 which was highly positive.

**Equipments:** Lime dust/color paint, non-slip floor or mat at least 3x1.75 mt, stopwatch, measuring tape. (Marking can made on flex also)

**Description of Test Area:** a rectangle shape area length 2.25 mt and wide 1.50 mt. divided the area length wise three divisions and two divisions wide wise. There were total six boxes; each box was .75 m square. The movement direction is illustrated in the fig-1.

**Test Administration:**

- A demonstration of the test was given. Then the tester repeated the instructions.
- On the command 'ready', the subject is asked to stand behind the starting line on left foot.
- On the signal 'go' the subject had to jump by left leg and landed with right leg on the middle of box marked as 'R' as per direction gave by arrow mark in the picture.
- After landing subject is required to maintain a steady position on toe (by raised heel) up to maximum five seconds.
- After five seconds there was command 'next', then the subject jumped with right leg and landed on 'L' marked area on left foot and stay for another five seconds on left toe.
- Subject is asked to repeat the processes till the last box come.

**Scoring:**

- There was total 60 points for six boxes, out of maximum point which may be scored at each box (specific landing area) was 10.
- At each landing point, five points were for proper landing and five for steady balance up to five seconds.
  - Proper landing means marked area 'L' or 'R' fully covered by leg. If a subject do not covered the marked area, then the score will be zero for landing in a single box.
  - Five points awarded for balance on toe up to five seconds in marked area. If a subject unable to stay for five seconds, then the score will be zero for a single box.

- Three trials were given and the average was considered as the final score.

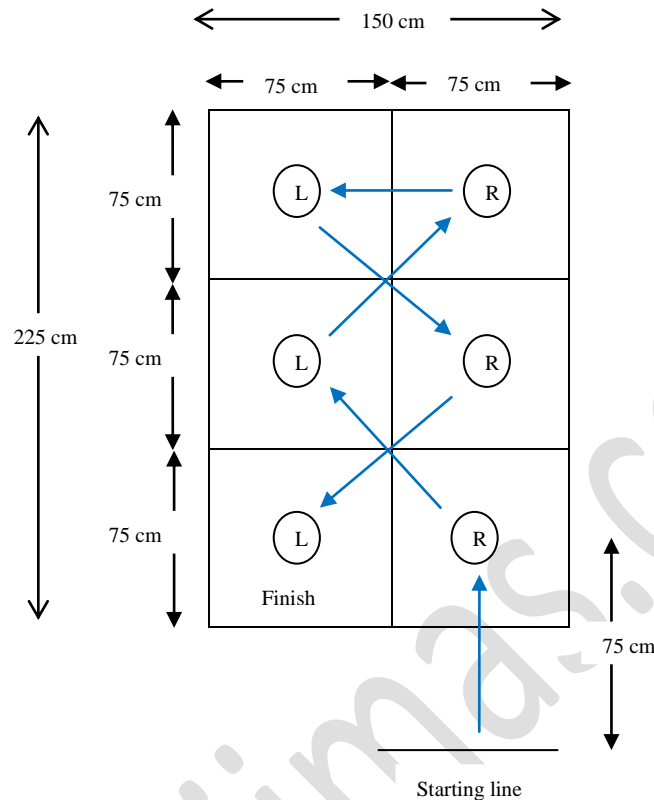


Fig.-1 Illustration of dynamic balance test

#### Important salient feature:

- jump on specific marked area
- after landing, raise heel and maintain balance on toe
- stay for five seconds on every marked area
- move from one marked area to another only after the command 'next'

#### CONCLUSIONS:

On the basis of the above discussions the following conclusion has been drawn:

- This test is applicable for 10-14 years of West Bengal secondary school students.
- It is economic and less time consuming.
- The measurement feasibility of this test was more than other dynamic balance tests.

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