International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 8; Issue 02(G); February 2019; Page No.17553-17557
DOI: http://dx.doi.org/10.24327/ijcar.2019.17557.3334

Research Article

COMPARISON OF STATIC AND DYNAMIC BALANCE IN FOOTBALL PLAYERS WITH AND WITHOUT SOCCER SHOES

Supriya Teli., Shruti Patil and Ajay Kumar

DPO's Nett College of Physiotherapy, Thane, India

A R T I C L E I N F O

Article History:

Received 4th November, 2019
Received in revised form 25th December, 2018
Accepted 23rd January, 2019
Published online 28th February, 2019

Key words:

Static Balance, Dynamic Balance, Soccer Shoes, Modified SEBT, Single leg Balance test.

A B S T R A C T

Aim: To compare static and dynamic balance in football players with and without soccer shoes.

Background: Balance is the condition in which all the forces acting on the body are balanced such that the center of mass is within the base of support. Balance depends on cutaneous and proprioceptive inputs from feet to central nervous system for stability and locomotion

Methodology: This was a comparison study. 60 football players with age groupbetween 18 to 25 years were included in the study. Static and Dynamic balance was assessed using single leg stance test and modified Star Excursion Balance Test (M-SEBT) on the same subject. Static balance was assessed using single leg stance test, which had two components- eyes open and eyes closed on one subject first with barefoot and then with soccer shoes and reading was recorded. Dynamic balance was assessed using M-SEBT test in three directions anterior, posteromedial and posterolateral and reading was recorded. results were statistically analysed.

Results:

1. Data was not normally distributed
2. Static balance was assessed with single leg stance test with eyes open and eyes close and it was found out to be better in barefoot subjects as compared to subjects wearing soccer shoes(p value <0.001)
3. Dynamic balance was assessed with modified SEBT test and it was found out to be better in subject wearing soccer shoes as compared to in barefoot subject (p value< 0.001)

Conclusions: static balance was better in barefoot subjects as compared to subjects wearing soccer shoes whereas dynamic balance was better in subjects wearing soccer shoes as compared to bare foot subjects.

INTRODUCTION

Balance is the condition in which all the forces acting on the body are balanced such that the center of mass is within the base of support. Balance relies on rapid, continuous feedback from visual, vestibular and somatosensory structure and then executing smooth andco-ordinated neuromuscular actions. Static balance is the ability to maintain postural stability and orientation with the center of mass over the base of support and the body at rest. Dynamic balance is the ability to maintain postural stability and orientation with the center of mass over the base of support while parts of the body are in motion. Factor influencing balance are Center of mass, Base of support and Muscles and Joints. System influencing balance are Sensory, Motor and central nervous system.[6]Firm ground cleats are perhaps the most commonly used cleat type; they generally vary from 10-14 on the outsole plate. Studs provide and address pivot points, impact points, and stability in order to maintain control and comfort for the average player.[7]

Static and dynamic balance depends on cutaneous and proprioceptive inputs from feet to central nervous system for stability and locomotion. Footwear act as sensory filter between feet and external environment. Soccer boot allow stability while changing direction. Stud facilitate the foot sticking to ground and stability in order to maintain control of movement by keeping low center of gravity on a field. Soccer players require complex movement to complete football task balanced on one leg. For passing, receiving, kicking, crossing and dribbling movement are completed while balancing on one leg. Player need balance because they are moving and adjusting body position constantly. [8]

Uni-pedal stance test is to assess static balance. It is a simple test for measuring static balance that can be used in a variety of settings and requires minimal equipment. The Uni-pedal

Corresponding author:* **Supriya Teli
DPO's Nett College of Physiotherapy, Thane, India

stance test is described as a method of quantifying static balance ability. Reliability of for Uni-pedal stance test eyes open is 0.989-0.996 and 0.996-0.999for eyes closed.[5]

mSEBT(modified Star Excursion Balance Test) used to detect dynamic balance deficits, and to evaluate dynamic balance improvement in individuals after following a preventive training program. Measures dynamic balance, while a person maintains balance on a single leg and simultaneously reaches as far as possible with the other leg along the reach line of three directions anterior, posteromedial and posterolatera. Reliability of mSEBT is 0.87 to 0.94. [1]

MATERIALS AND METHODS

Study Design

Type of study : comparative study
Population: football players
Duration of study: 12 months

Sample Design

Type of sampling: convenient sampling
Sample size : 60
Location : metropolitan city

Materials Used

Soccer shoes
Measuring tape
Pen
Pencil
Stopwatch
Uni-pedal stance test
Modified Star Excursion Balance Test

Inclusion Criteria

- Football players willing to participate in study
  Football player age group 18 to 25

Exclusion Criteria

- Player Having musculosketal problem
- Player having history of neuromuscular trauma
- Vestibular problem
- Visual problem
- Player with flatfoot
- Ankle instability
- Ankle sprain
- Concussion in 12 week before study
- Fracture less than 6 month

Procedure

- 60 subject who are willing to participate will be included in the study.
- All participate will be screened as per inclusion and exclusion criteria.
- Purpose of the study and procedure will be explained to the subject prior to the study.
- A written inform consent will be taken from all subject prior to participation.

For static test uni-pedal stance test will be performed on participant's standing barefoot first, then with soccer shoes. For Uni-pedal stance test the participant's will be asked to stand on non-dominant leg with arms crossed on chest or place hand over hips and bend the other knee without touching the weight bearing leg. In barefoot, first with eyes open: Once standing in starting position keeping eyes open, the subject is asked to raise dominant leg and keep the leg raised without touching other leg. Time to administer: 2 minutes. The timer starts once foot islifted off the ground. The timer is stopped when subject's foot either touches the floor, makes contact with the other leg, moves his/her stance foot or moves arms out of the testing position. Mean of 3 trials test reading will be recorded. Then in barefoot with eyes closed mean of 3 trials test reading will be recorded. Again with the same participants uni-pedal stance test will be performed with soccer shoes, both eyes open and eyes closed and each test 3 trials mean value will be recorded.

For dynamic test Modified Star Excursion Balance Test will be performed on participant's standing barefoot first then, with soccer shoes. Modified Star Excursion Balance Test will be performed by standing in the middle of the point marked formed by 3 lines extending out at 135 degree from each other. Participants will be allowed to practice reaching in each of the 3 direction 3 to 6 times following 5 minutes rest time before the trials. Then participants will be asked to stand on non-dominant leg with barefoot and reach as far as possible along the each lines and return back to center point. The reach limit will be marked and average will be noted of 3 trials
The test will be repeated if subject:

1. Transfer weight onto reach foot
2. Fails to maintain unilateral stance
3. Moves the stance leg
4. Fails to return reach foot to starting position
5. Fails to keep the hands on the hips

Between each 3 trials 2 minutes rest will be given
Again the mSEBT will be performed with the same participants standing on non-dominant leg with soccer shoes.3 trial average reading will be recorded

RESULTS

1. Data was not normally distributed
2. Comparison of Static balance between barefoot and soccer shoes subject was done using Mann-Whitney U test and it was found to be statistical significant with p value (<0.0001) in both the component eyes open (p value <0.001) and eyes closed (p value <0.0001) this indicates that static balance was found to be better in subjects with barefoot
3. Comparison of dynamic balance between barefoot and soccer shoes subject was done using Mann-Whitney U test and it was found to be statistical significant with p value (<0.0001) in all the 3 direction that is Anterior (p value <0.0001) Posteromedial (p value <0.0001) and Posterolateral (p value <0.0001) this indicates that dynamic balance was found to be better in subjects with soccer shoes.

Statistical Analysis

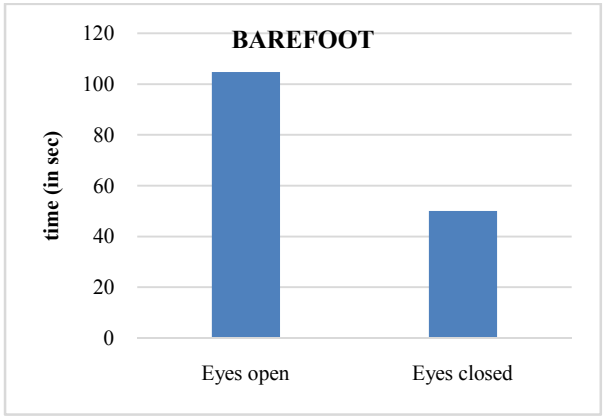
Table 1 Subjects characteristic

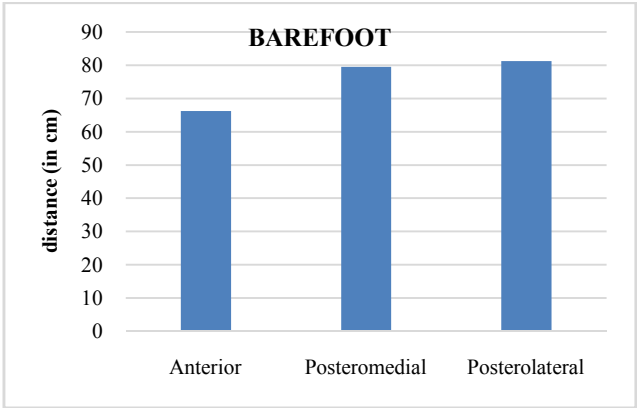
VARIABLES	MEAN±
AGE	22.1 ± 1.98
LIMB LENGTH (in cm)	91.96 ± 2,65
BMI (kg/m^2)	23.09 ± 1.12

Table 2 Data of static and dynamic balance with barefoot and soccer shoes subjects

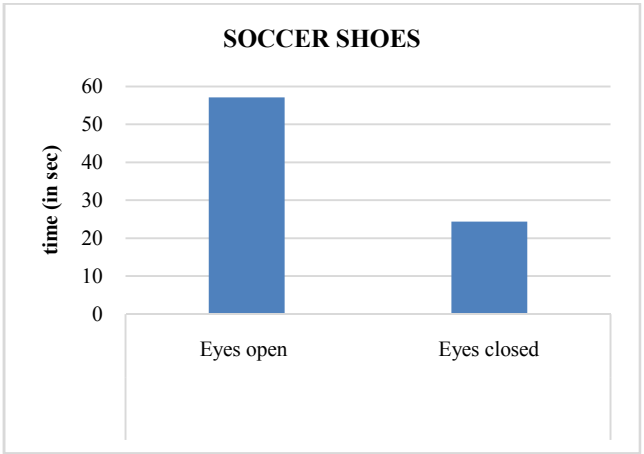
Static balance	Barefoot MEAN ±SD	Soccer shoes MEAN ±SD	P value
EYES OPEN in (time)	104.83 ± 11.20	57.14 ± 5.90	<0.001
EYES CLOSE in (time)	50.03 ± 4.80	24.38 ± 4.06	<0.0001

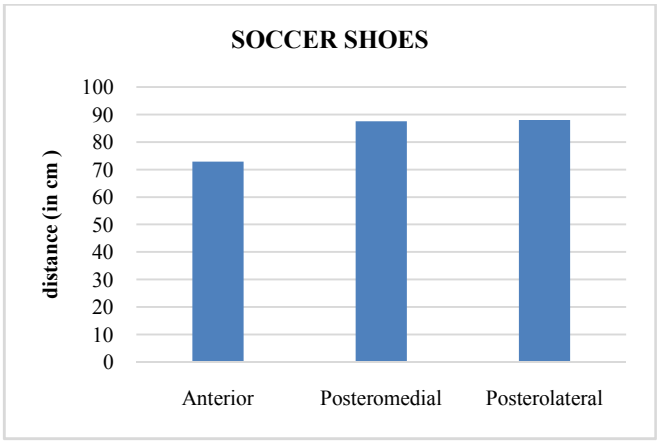
Dynamic balance	Barefoot Mean ±sd	Soccer shoes Mean ±sd	P value
Anterior (in cm)	66.26 ± 4.99	72.84 ± 4.27	<0.0001
Posteromedial (in cm)	79.49 ± 5.38	87.52 ± 5.13	<0.0001
Posterolateral (in cm)	81.28 ± 4.95	87.99 ± 5.19	<0.0001





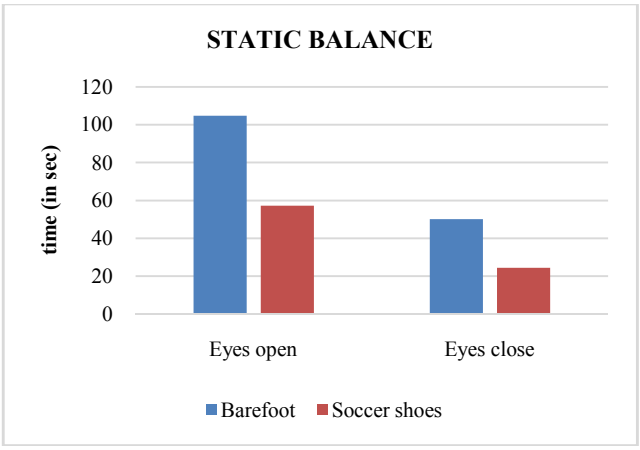
Graph 1 Graph of static and dynamic balance with barefoot subjects





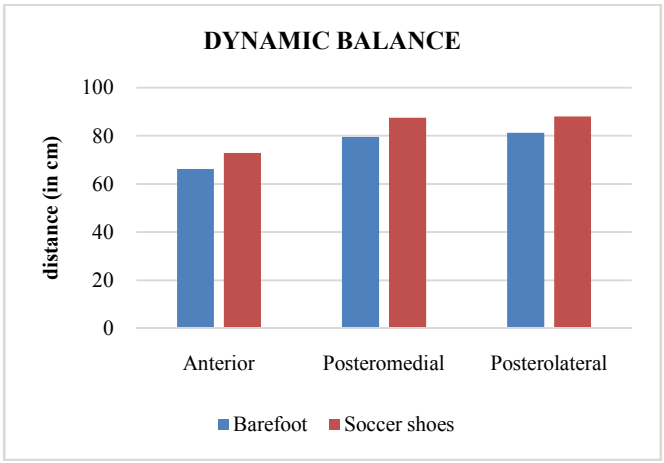
Graph 2 Graph of static and dynamic balance with soccer shoes subjects

***Graph and Table*:** Following Graph and Table of comparison static balance with barefoot and soccer shoes subjects measured in seconds



Interpretation: Comparison of Static balance between barefoot and soccer shoes subject was done using Mann-Whitney U test and it was found to be statistical significant with p value (<0.0001) in both the component eyes open (p value <0.001) and eyes closed (p value <0.0001) this indicates that static balance was found to be better in subjects with barefoot

***Graph and Table*:** Following Graph and Table of comparison of dynamic balance with barefoot and soccer shoes subjects



Interpretation: Comparison of dynamic balance between barefoot and soccer shoes subject was done using Mann-

Whitney U test and it was found to be statistical significant with p value (<0.0001) in all the 3 direction that is Anterior (p value <0.0001) Posteromedial (p value <0.0001) and Posterolateral (p value <0.0001) this indicates that dynamic balance was found to be better in subjects with soccer shoes.

DISCUSSION

The purpose of this study was to compare static and dynamic balance in football players with and without shoes. In this study, 60 subjects with age group 18-25 years were included. The modified SEBT scale and single leg stance was used to assess dynamic balance and static balance respectively. The results showed that static balance was better in barefoot subjects as compared to subjects wearing soccer shoes whereas dynamic balance was better in subjects wearing soccer shoes as compared to barefoot subjects.

The purpose of this study was to compare static and dynamic balance in football players with and without shoes. In this study, 60 subjects with age group 18-25 years were included. The modified SEBT scale and single leg stance was used to assess dynamic balance and static balance respectively. The results showed that static balance was better in barefoot subjects as compared to subjects wearing soccer shoes whereas dynamic balance was better in subjects wearing soccer shoes as compared to barefoot subjects.

Balance is the condition in which all the forces acting on the body are balanced such that the centre of mass is within the base of support. Static balance is the ability to maintain postural stability and orientation with the centre of mass over the base of support and the body at rest. Dynamic balance is the ability to maintain postural stability and orientation with the centre of mass over the base of support while parts of the body are in motion. Static and dynamic balance depends on cutaneous and proprioceptive inputs from feet to central nervous system for stability and locomotion. In a study conducted by William ros, *et al*. stated that static balance was better in bare feet. This is likely because there is no filtering of sensory input indicating that they have better tactile and proprioceptive feedback leading better static balance[4]. Also in bare feet there are more points of references on the sole of foot. Plantar proprioception activates reflexes and helps the central nervous system make decisions that help increasing stability[8]. Static balance was lesser in subjects with soccer shoes. The probable reason could be that in subjects with soccer shoes there is filtering of sensory input thus leading to lesser tactile and proprioceptive feedback [8]. Also because of prolonged use of shoes there is wearing off of the studs thus making them uneven and impairing balance ability. In a study conducted by Angela Notarnicola, *et al* stated that there was greater stability in subjects wearing soccer shoes than subjects who were barefoot. This could be because first, the greater shoe ground contact area compared to bare foot could result in the measurement of an increase in the support base. Second, the increased width of shoes, compared when barefoot ,could increase the base of support to avoid contact between feet. Third, shoes could act as a sensory filter byreducing proprioceptive feedback, and leading to posture modifications to improve stability[8]

Postural stability is actively controlled by the central nervous system, which processes the afferent visul, otolithic, and somato-sensorial information. footwear may influence the quality of sensory feedback from the feet and act as a sensory filter between the feet and the external environment. Thus stability is better in subjects with soccer shoes thus improving balance in subjects with soccer shoes. The probable reason for poor dynamic balance in subjects with barefeet might be that in barefeet the base of support is lesser as compared to base of support in subjects with soccer shoes, also because there is no filtering of sensory input there are no imposing demands to make postural modifications on the body as compared to subjects with soccer shoes in whom the filtering of sensory input imposes demand on body to make postural modifications thus improving stability[8].

CONCLUSION

Thus our study concluded that static balance is more in barefoot subjects as compared to subjects wearing soccer shoes whereas dynamic balance is more in subjects wearing soccer shoes as compared to bare foot subjects.

Acknowledgement

We thank principal sir, guide and all the staff of DPO's Nett College of Physiotherapy, Thane, respected parents for support, co-operation and last but not the least almighty for keeping spirits high throughout the study.

References

1. Van Lieshout R, Reijneveld EAE, van den Berg SM *et.al,* Reproducibility of the modified star excursion balance test composite and specific reach direction scores, International Journal of Sports Physical Therapy. 2016;11(3):356-365.
2. Asma Razeghi *et.al,* The ability of modified star excursion balance test to differentiate between women athletes with and without chronic ankle instability, MSc in Sport injuries and Correction Exercise, Faculty of Sport Science, University of Isfahan, Isfahan, Iran, International Journal of Medical Research & Health Sciences, 2016, 5, 5(S):210-215
3. Lee Shimwell *et.al,* The validity of the modified star excursion balance test as a predictor of knee extensor and hip abductor strength, International Journal of Physiotherapy and Research. 5. 1863-1871. 10.16965/ijpr.2016.208.
4. William Rose *et.al,* Effect of footwear onbalance,University of Delaware, Newark, DE, USA 2011.
5. Springer BA *et.al,* Normative values for the unipedal stance test with eyes open and closed, Department of Orthopedics and Rehabilitation, Walter Reed Army Medical Center, Washington, DC, USA, J Geriatr Phys Ther. 2007;30(1):8-15.
6. Susan B. O'Sullivan, Physical Rehabilitation fifth edition, EdD PT 2007
7. Howard Liebeskind, DPM, The Biodynamics of Soccer and Soccer Cleat Design, American Academy of Podiatric Sports Medicine, podiatry management, march 2011, 189-194
8. Angela Notarnicola *et.al,* Effect of different types of shoes on balance among soccer players, Department of Neuroscience and Organs of Sense, Orthopedics Section, Faculty of Medicine and Surgery of University of Bari, General Hospital, Italy, Muscles, *Ligaments and Tendons Journal* 208 2015;5 (3):208-213

9. Ian C. Kenny *et.al,* Influence of ankle taping on dynamic balance performance, Biomechanics Research Unit, University of Limerick, Ireland, Portuguese *Journal of Sport Sciences* 2011:659-662
10. T H Trojian, D B Mckeag , Single leg balance test to identify risk of ankle sprains, *Br J Sports Med* 2006 Jul; 40(7): 610–613
11. Mendon S *et.al,* Impact of Shoes on Dynamic Balance Among Athletes Participating in Special Olympics- a Cross Sectional Study, BMR Medicine, March 31, 2015;2(1):1-7
12. Con Hrysomallis, Balance ability and athletic performance, Institute of Sport, Exercise and Active Living, School of Sport and Exercise Science, Victoria University,Sports Med 2011; 41 (3): 221-23
13. Barone R *et.al,* Soccer players have a better standing balance in nondominant one-legged stance, *Open Access Journal of Sports Medicine*, 2011;2:1-6
14. Marco Bigoni*et al*.Balance in young male soccer players: dominant versus non-dominant leg Sport Sci HealthAugust 2017, Volume 13: 253-258
15. Clagg S, Paterno MV et.al,Performance on the modified star excursion balance test at the time of return to sport following anterior cruciate ligament reconstruction, *J Othrop Sports Phys Ther* 2015 Jun;45(6):444-52
16. Gerbino PG, Griffin ED, Zurakowski D. Comparison of standing balance between female collegiate dancers and soccer players. Gait Posture. 2007;26(4):501–507
17. Hennig EM. The influence of soccer shoe design on player performance and injuries. Res Sports Med. 2011;19(3):186–201
18. Smith N, Dyson R, Janaway L. Ground reaction force measures when running in soccer boots and soccer training shoes on a natural turf surface. Sports Engineering. 2004;7(3):159–167.
19. Lees A, Nolan L. The biomechanics of soccer: a review. J Sports Sci. 1998;16(3):211–234
20. Zeynep Inci KARADENIZLI *et.al,* Comparision of dynamic and static balance in adolescents handball and soccer players, *Turkish Journal of Sport and Exercise*. 2014;16(1):47-54

How to cite this article:

Supriya Teli., Shruti Patil and Ajay Kumar (2019) 'Comparison of Static and Dynamic Balance in Football Players with and Without Soccer Shoes', *International Journal of Current Advanced Research,* 08(02), pp.17553-17557.
DOI: http://dx.doi.org/10.24327/ijcar.2019.17557.3334

****