



## RESEARCH ARTICLE

### ASSESSMENT OF DYNAMIC BALANCE IN JUMPERS KNEE ATHLETES

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#### ARTICLE INFO

##### Article History:

Received 10<sup>th</sup> April, 2021

Received in revised form

06<sup>th</sup> May, 2021

Accepted 17<sup>th</sup> June, 2021

Published online 30<sup>th</sup> July, 2021

##### Keywords:

Dynamic Balance,  
Balance Assessment, Jumpers' Knee.

#### ABSTRACT

**Background:** Patellar tendinopathy presents one of the most common and formidable challenges for competitive athletes and sports medicine clinicians. Diagnosed clinically as activity-related anterior knee pain associated with focal patellar tendon tenderness it is frequently the source of chronic pain and limits athletic practice and performance. . The prevalence of jumper's knee (patellar tendinopathy) is high, up to 40% 50%, in sports characterized by high demands on leg extensor speed and power, such as volleyball, basketball, football, and athletics. Balance relies on the integrated feedback and movement strategies among the hip, knee, and ankle, balance can be disrupted by diminished afferent feedback or deficiencies in the strength and mechanical stability of any joint or structure along the lower extremity kinetic chain. Poor balance has been associated with increased injury risk among athletes. **Aim of the study:** The purpose of the study was assess the dynamic balance in athletes with jumpers knee **Subjects and Methods** Fifteen basketball subjects with jumper's knee were included in this study with age ranged from 15-30 years and body mass index ranged from 18.5-30 kg/cm<sup>2</sup> participated in this study. The assessment was conducted for each subject individually on the Balance System (Biodex Medical Systems Inc, Shirley, NY, USA), to compare stability parameters between affected and non-affected lower limbs. The stability parameters examined in this current study were overall stability index, anteroposterior stability index and mediolateral stability index. **Results:** Statistical analysis using T-test was made to compare between the mean values of stability indexes There was no significant difference between the mean value of overall stability index (t = - 0.09, p =0.46) ,anteroposterior stability index (t = 0.07, p =0.47)and mediolateral stability index (t = - 0.17, p =0.43) in affected limb compared with non-affected at stability level 4 **Conclusion:** There was no significant difference observed the mean value of stability indexes in the comparison of affected side and unaffected side in lower limb in athletes with jumpers knee.

#### INTRODUCTION

Patellofemoral pain (PFP) is a frequent cause of anterior knee pain in athletes, which affects patients with and without structural patellofemoral joint (PFJ) damage. Younger patients do not have any structural changes to the PFJ, about 25% of recreational athletes diagnosed with PFP will stop participating in sports because of knee pain<sup>1</sup>. Dynamic balance is defined as the ability to preserve balance and manage of the torso and distal parts of the body throughout active movement. Applying exterior forces as long as trying to keep dynamic balance figure outs the foundation of achievement in the majority of sports and in fact it is a requirement in daily functions<sup>2</sup>. The matter of dynamic progress is very significant since largely musculoskeletal disorders will happen in the shape of dynamic activity. The ability to keep postural direction whether internal or external forces involved, is related to postural stability<sup>3</sup>.

Assessment of dynamic balance is important in sports because they represent similar challenges to the postural control system and may have better prognostic and predictive value.<sup>4</sup> Despite this several studies have found that static assessments of balance may predict injury<sup>5-6</sup> although others have found no correlation.<sup>7</sup> Dynamic assessments of balance are less common<sup>8</sup>, but may be more relevant to sporting performance and injury because of the movement patterns involved.<sup>4</sup> A variety of dynamic balance tests exist. Myer *et al.*, (2006) studied the deviations in the center of pressure in mediolateral and anteroposterior directions as well as maximal vertical ground reaction forces on one leg before hopping forward 50 cm onto a force plate and maintaining balance on the same leg for 10 s .and he concluded that even this protocol is a dynamic balance task, the distance jumped is not indicative of the higher intensity jumps experienced during sport.<sup>8</sup>

## MATERIALS AND METHODS

The purpose of the study was to assess dynamic balance in jumper's knee athletes. Biodex stability system was used to compare stability parameters between affected and non-affected lower limbs. The dynamic balance measurements in this current study were overall stability index, anteroposterior stability index and mediolateral stability index. Fifteen subjects were assigned into one group with mean age of 22.57 ( $\pm$  2.70) years, mean weight of 99.78 ( $\pm$ 7.11) kg, and mean height of 190.14 ( $\pm$ 4.22) cm participated in this study. Subjects with jumper's knee were included in this study after screening them for inclusion and exclusion criteria. Those who fulfil inclusion criteria were asked to give written consent stating voluntary acceptance to participate in this study. These criteria involved; two leg comparison's test was chosen; and the subject was instructed that the platform will be unstable just after the alarm. Each subject was instructed to maintain a level platform for the period of the test. Stability level 4 was used in this study as well the same procedure was done for the other leg. For each test trial, subject was asked to keep the platform level for 20 seconds with single leg support

## RESULTS

Using Biodex stability system to assess dynamic balance in jumper's knee athletes and comparing stability parameters between affected and non-affected lower limbs. Data were collected and Statistical analysis using T-test was made to compare between the mean values of stability indexes. At stability level (4) the mean  $\pm$  SD overall stability index of affected lower limb was  $5.61 \pm 1.38$  and for the non-affected lower limb was  $5.55 \pm 0.71$ . There was no significant difference between the mean value of overall stability index in affected limb compared with non-affected at stability level 4 ( $t = -0.09$ ,  $p = 0.46$ ). The mean  $\pm$  SD anteroposterior stability index of affected lower limb was  $4.55 \pm 1.35$  and for the non-affected lower limb was  $4.6 \pm 0.68$ . There was no significant difference between the mean value of anteroposterior stability index in affected limb compared with non-affected at stability level 4 ( $t = 0.07$ ,  $p = 0.47$ ). while the mean  $\pm$  SD mediolateral stability index of affected lower limb was  $3.3 \pm 1.16$  and for the non-affected lower limb was  $3.2 \pm 0.92$ . There was no significant difference between the mean value of mediolateral stability index in affected limb compared with non-affected at stability level 4 ( $t = -0.17$ ,  $p = 0.43$ ).

## DISCUSSION

Despite these tests may highlight whether a postural control deficiency exists, they give no information on the origin of the deficiency due to a lack of information on segmental orientation and center of mass.<sup>9</sup> Because of the current lack of quantification in human movement and the absence of a complete set of dependent variables, qualitative assessments may represent good utility for the applied setting.<sup>10</sup> Some assessment tests require the athlete to perform the movement, but if the athlete are using a stepping strategy to regain balance, the trial is frequently repeated<sup>11</sup>. This may overestimate balance ability in performance tests.<sup>12</sup> Static tests are not adequate for measuring improvements in dynamic balance, according to Holm *et al.* (2004), because training programs that include jumping, landing, cutting, and wobble boards may improve dynamic balance but not static balance or

proprioception.<sup>13</sup> Ross and Guskiewicz, in (2004) compared the effect of previous injury on balance measures and showed different responses to static and dynamic tests.<sup>14</sup> In our study statistical analysis using T-test was made to detect differences between the mean values of stability indexes. There was no significant difference between the mean value of overall stability indices between affected and non-affected lower limb in subjects with jumpers knee at stability level 4. Our findings are in agreement with data reported by Erdoganoglu *et al.*, (2020) that there was no significance difference in postural dynamic balance was observed in the comparison of affected side and unaffected side in patients with patellofemoral pain syndrome.<sup>15</sup> Another study made by. Zamboti *et al.*, (2017) investigated static postural control did not show any significant differences, even in the normalization of all directions in patients with a variety of lower extremity conditions.<sup>16</sup> This may be due to the interaction of many kinematic changes related to lower extremities including pelvis, hip, and ankle, so reciprocal mechanisms in the anatomical structures may compensate the postural balance dynamically. The overlap between balance strategies is commonly used by subjects like ankle, hip and stepping strategy.

## Conclusion

There was no significant difference observed the mean value of overall stability indices, anteromedial stability index and mediolateral stability index in the comparison of affected side and unaffected side in lower limb in athletes with jumpers knee

**Conflict of interest:** There is no conflict of interest.

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