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COMPARISION OF DIFFERENT SURFACE TO JUMPING ABILITY IN 14-16 AGE FEMALE VOLEYBALL PLAYER[2]

ABSTRACT

The aim of this study is to examine ability of jump performance on the sand, wood and taraflex surface in 14 -16 age female volleyball players. Twenty female subjects were participated in this study. Players averaged 15.10±1.07 years of age, 172.40±14.56 cm of body height and 60.00±6.40 kg body weight. Each jumping measurement tests were taken into 3 days. Subjects were performed three different jumping tests; counter movement jump (CMJ), squad jump (SJ) and stiffness jump (stiffness peak jump (SPJ) and stiffness average jump (SAJ)) test using by Free Jump (Sensorize Rome, Italy). The results revealed that there was a significant differences between sand to wood and taraflex surface in CMJ, SJ and both Stiffness Jump. Moreover only Stiffness Average Power differences were found between wood and taraflex surface. Jumping performance of the subjects was significantly higher on the taraflex surface compared to sand surface and it could be concluded that the surface differences affect the jumping performance.
Key Word: Volleyball, Jump, Sand, Wood, Taraflex

FARKLI ZEMİNLERİN 14-16 YAŞ VOLEYBOLCULARDA SIÇRAMA BECERİSİNE ETKİSİNİN KARŞILAŞTIRILMASI

ÖZ

Çalışmanın amacı 14-16 yaş grubu bayan voleybolcuların kum, parke ve tarafleks zeminlerdeki farklı sıçrama yeteneklerinin incelenmesidir. Araştırmaya Gazi Üniversitesi Spor Kulübünde voleybol oynayan, yaş ortalamaları 15.10±1.07 yıl, boy ortalaması 172.40±14.56 cm ve vücut ağırlığı ortalamaları 60.00±6.40 kg olan 20 sporcu katılmıştır. Sıçrama performansı ölçümlerinde Free Jump (Sensorize Rome, Italy) kullanılmıştır. Sıçrama yetenekleri counter movement sıçrama (CMS), squat sıçrama (SS) ve stiffness sıçrama olmak üzere üç farklı şekilde ölçülmüştür. Ölçümler üç kez yapılmış ve en iyi sonuçlar kayıd edilmiştir. Stifnes sıçramada ise en iyi sıçrama (SES) ve Ortalama Sıçrama değerleri (SOS) kullanılmıştır. Verilerin analizi SPSS 11.5 paket programında One Way Anova ile yapılmış gurplar asındaki farlılığa da Tukey testi ile bakılmıştır. Sonuç olarak; 14-16 yaş gurubu bayan voleybolcuların farklı zeminlerdeki sıçrama yeteneklerinin araştırıldığı bu çalışmada kum zeminin sıçrama performansını düşürürken tarafleks zeminin artırdığı tespit edilmiştir.

Anahtar Kelimeler: Voleybol, Sıçrama, Kum, Parke, Tarafleks

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INTRODUCTION

Volleyball is a dynamic physical game with high tempo and uncertain match duration (Kenny, 2006). Volleyball is a competitive sport played on many different court surfaces depending on whether it is being conducted indoors or outdoors. Thus indoor volleyball is played upon a hard flat surface that is mostly made out of wood or other synthetic materials, while outdoor volleyball is played upon concrete, grass or most commonly sand (Gortsila et al. 2013). Jumping performance is important in volleyball and frequently used in different technical elements such as spiking, blocking and serving during the match. According to Bishop (2003), vertical jump height is critical for success in beach volleyball; by Turpin et al (2008) of ten elite beach volleyball players during the 2005 Valencia European Beach Volleyball Championships reported that the mean number of jumps was 219.0±7.4 jumps per match, 100.5±19.6 per set, 5.8±0.2 per point (44% spike jumps, 17% serve jump, 39% block jumps). When technical elements and tactical functions preferred in the play were examined, Turpin et al (2009a) found female players used offensive movement patterns 59% (50% were attacking moves, 16% were attack preparation moves) of the time, compared with 41% for defensive movement patterns. Out of all jumps, 71% were spike jump, 20% block jump and 9% serve jump (Bishop 2003; Turpin 2008; Turpin et al.2009a,b).

Jumping performances and quickness parameter of volleyball players have been evaluated in terms of their experience and training age and results revealed that experienced players possess much better jumping performance. Gabbett and colleagues evaluated the effect of training, conducted on different surfaces, on the technical skills of junior volleyball players before and after 8-week skill-based training program (Gabbett et al. 2006). Investigators reported that training induced significant improvements in spiking, setting and passing accuracy and spiking and passing technique. The above mentioned study along with many other volleyball studies were all conducted on hard-court surface and according to our knowledge there is little or no research regarding the influence of different training surfaces on volleyball performance (Barnes et al. 2007; Gabbett et al. 2006).

Jumping, being necessary for athletic performance and providing physiological change, requires maximal force and decreases the duration of the contact with the surface as far as possible. Coupled with falling on the surface, the quadriceps muscle group extends and stretches. Connective tissue and tendons also stretch and consequently potential elastic energy emerges. Likewise potential elastic energy also appears in cross bridges. That energy is stored during eccentric contractions and during transition to concentric contraction a great power manifests through benefiting from the force of gravity (Chu1992). Jumping force which is regarded to be an effective parameter for the volleyball match result, gets directly affected from maximal force. If it is desired to measure the influence of only contractile components, squad jump test is applied. To measure the effect of both contractile and visco elastic components, counter movement jump test is utilized (Impellizzeri 2008). The difference between CMJ height and SJ height provides an information about

elastic force (Chu 1992; Impellizzeri 2008).

Especially in volleyball Barnes et al. showed that counter movement jumping ability is correlated with agility and can be used as a predictor of agility test time (Barnes et al. 2007). More recently Sassi et al. tried to establish a modified agility t-test and showed that is still highly correlated to countermovement jump and 10m sprint highlighting the significance of agility on sport performance (Sassi et al. 2009).

When previous studies conducted on volleyball players were examined, it was seen that despite many studies (Stanganelli 2008; Ercolessi 2000; Rousanoglou 2008; Tokuyama 2005; Ciccarone 2008; Ciccarone 2005) primarily focused on the measurement of jumping performance as an effector of success by various means, there were only limited number of studies which investigated the influence of different training surfaces on jumping performance (Impellizzeri 2008; Miyama 2004; Bishop 2003). Therefore the aim of this study is to investigate jumping performance of 14-16 age group female volleyball players on sand, wood and taraflex surface.

METHOD

Twenty female volleyball players of Gazi University Sport Club with averaged 15.10±1.07 years of age, 172.40±14.56 cm of body height and 60.00±6.40 kg body weight participated in this study. Measurements were taken every other day at the same time, first day on wood, second day on sand and third day on taraflex surface. Body height was measured by SECA brand stadiometer, weight was measured by Tanita BC-418 body composition analyzer (Tanita Corp., Tokyo, Japan) and jumping performance was recorded by Free Jump device (Sensorize Rome, Italy). Subjects were performed three different jumping tests; counter movement jump (CMJ), squad jump (SJ) and stiffness jump (best jump and average jump) tests. Each different performance measurements were repeated three times and best results were recorded. For stiffness measurements the best jump (SPJ) and average jump (SAJ) values were recorded. Analysis of data was performed by SPSS 11.5 package. One way Anova was utilized for data analysis and Tukey test was applied to reveal difference between the groups. 0,05 was set as significance threshold for statistical analysis.

We have no conflict of interest.

RESULTS

Significant difference between sand to wood and taraflex surface in CMJ, SJ, SPJ and SAJ was observed. Only SPJ parameter differed in between wood and taraflex surface (Table 1).

Table 1: Jumping performance measurement of female volleyball players on different training surfaces

Surface	CMJ (cm)	SJ (cm)	Stiffness	
			SPJ (cm)	SAJ (cm)
Sand (s)	31,90±2,44 w*, t*	32,05±2,85 w* , t*	31,50±2,32 w* , t*	25,90±3,40 w*, t*
Wood (w)	34,55±2,89 s*	34,90±2,42 s*	34,15±2,18 s*, t*	29,25±2,97 s*
Traflex (t)	36,50±3,17 s*	36,30±2,95 s*	36,90±3,56 s*, w*	31,55±2,85 s*

* P<0,05

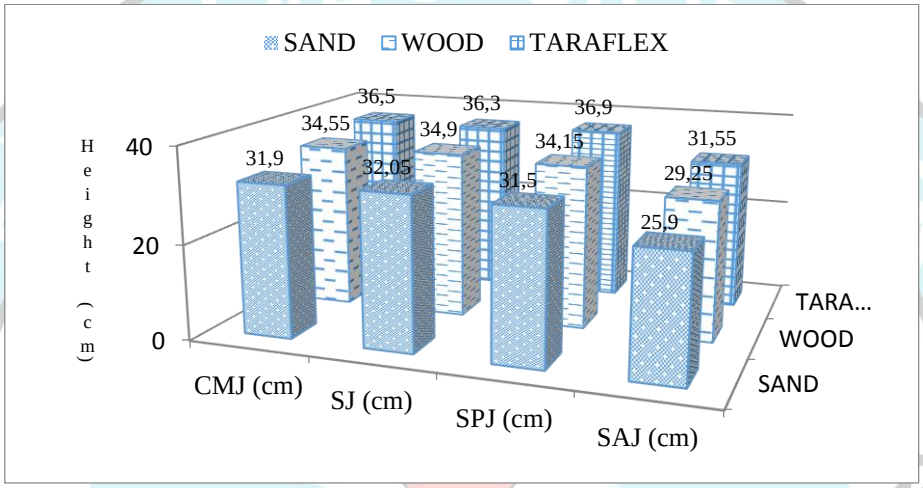


Figure 1: Jump parameters on different surface

Discussion and Conclusion

In this study jumping performances on different training surfaces were investigated and the best jumping performance was found to be on taraflex surface whereas the worst performance was observed on sand.

In recent years, especially upon huge improvement in technology after nineties; taraflex surface is being preferred to wood surfaces for indoor sports. This preference-shift occurred based on two main reasons; the first is to minimize risk of sport injuries and the second is to rise performance of sportsmen (Dura 1999).
Our study revealed the fact that CMJ, SJ and SAJ jumping performances of the subjects were significantly higher on the taraflex surface. Moreover also for SPJ parameter, better performance was observed on taraflex surface in comparison to wood. This difference is predicted to stem from the plastic structure of taraflex surface which makes it elastic and shock absorber (Dura 1999). Searching through the literature, it is suggested that slippery, dispersible and buried structure of sand results in mechanical work loss or reduced work efficiency of ankle and tendons; therefore decline in jumping performance depends on the training surface related efficiency loss rather than leg strength (Lejeune 1998).
Bishop (2003) in his study determined that vertical jumping performance plays critical role for success in volleyball. Moreover he declared that beach volleyball has been adapted from indoor volleyball and because the main difference between the two is the training surface; performance in relation to the surface property should be evaluated. Compared is the performance of 18 beach volleyball player on wood and sand surface through four separate

vertical jumps. Vertical jump measurements on sand were detected to be much lower in comparison to ones on wood. The reason for such significant difference was proposed to be the effect of sand surface on jumping mechanics (Bishop 2003). In another study conducted by Giatsis and colleagues, kinematic analysis of jump was carried out on 15 elite male beach volleyball players as they perform vertical squat jump on either sand or rigid surface. During jump performances, ankle joint range of motion and angular velocity were investigated. As a result squat jump height was found to be lower on sand surface than one on rigid surfaces. At the same time joint range of motion and angular velocity significantly differed in between sand and rigid surfaces. Consequently such difference in jumping performance might stem from the fact that during the motion body puts much more effort to equalize and balance itself on sand surface in comparison to rigid surfaces (Giatsis 2004).

Stretch-shortening cycle was previously indicated to be effective on the relationship between jump characteristics and training surface (Impellizzeri 2008). Our study revealed that the highest jumping performance was on the taraflex surface and this difference is predicted to stem from elastic and shock absorber property of the surface which consequently affects the stretch-shortening cycle (Dura 1999).

Different training surfaces affect not only jumping performance but also the parameters such as muscle damage, speed, quickness and balance (Impellizzeri 2008, Bishop 2003, Giatsis 2004). Impellizzeri and collegues investigated the effect of plyometric training, performed on different surfaces, on the jumping and sprint performance. Upon comparison of performances on wood, grass and sand surface it was revealed that soft surfaces decrease muscle damage and at the same time reduce jumping and speed performance. Thus it was suggested that soft surfaces are preferable more for trainings (Impellizzeri 2008).

In conclusion, our study where the jumping performances of 14-16 age group female volleyball players on different training surfaces were investigated; revealed that sand surface decreases jumping performance whereas taraflex surface increases it. Nowadays taraflex surface is the most widely and effectively used product of materials technology for its application in this sports field.

Up to date taraflex is the most effective surface material for the increased performance in all sports branches requiring jumping performance. Therefore taraflex surface usage is recommended for sports branches associated with the jumping performance.

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