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ACUTE EFFECTS OF KINESIOTAPING ON BALANCE IN SALSA DANCERS

ORIGINAL ARTICLE

ABSTRACT

Purpose: Non-professional salsa dance is a social, physical activity highly in demand. Since it is a vigorous physical activity, dancers are prone to have an injury during a dance performance, mainly in the ankle joint. In this study, the acute effects of kinesiotaping (KT) on balance in salsa dancers were investigated.

Methods: This study was a single-blind randomized placebo-controlled trial, in which a total of 20 amateur salsa dancers (mean age=26.35±4.74 years), voluntarily participated. Participants were divided into two groups randomly by using a sealed envelope randomization method: KT Group (n=10) and Placebo-KT Group (n=10). A muscle correction technique that covers the ankle and peroneal muscle group were applied to KT Group one day after pre-tests. An "I" shaped placebo KT application was performed for the Placebo-KT Group. Flamingo balance test (FBT) and the Star Excursion Balance Test (SEBT) were used to assess balance performance. All tests were repeated immediately after the application.

Results: In the intragroup analysis of the KT Group, SEBT scores showed a statistically significant increase ($p<0.05$) while there was no increase in FBT scores ($p>0.05$). We found no statistically significant difference in the intragroup analysis of Placebo-KT Group and the intergroup analysis of KT Group and Placebo-KT Group for both SEBT and FBT scores ($p>0.05$).

Conclusion: While KT application has been found to be effective in improving dynamic balance, it was not effective in improving static balance performance.

Key Words: Balance; Dancing; Kinesiotaping.

SALSA DANSÇILARINDA KİNEZYOBANT UYGULAMASININ DENGEYE OLAN AKUT ETKİSİ

ARAŞTIRMA MAKALESİ

ÖZ

Amaç: Salsa Dansı, talep gören sosyal bir fiziksel aktivitedir. Orta şiddetli bir fiziksel aktivite örneği olan bu dansta dansçılar, özellikle ayak bileği ekleminde olmak üzere, performans sırasında yaralanmaya eğilimlidir. Bu çalışmanın amacı, kinezyolojik bantlama (KT) uygulamasının salsa dansçılarında denge üzerine akut etkisini araştırmaktı.

Yöntem: Bu tek kör, randomize, plasebo kontrollü çalışmaya, toplam 20 amatör salsa dansçısı (ortalama yaş=26,35±4,74 yıl) gönüllü olarak katıldı. Katılımcılar rastgele yöntemle iki gruba ayrıldı: KT Grubu (n=10) ve Plasebo-KT Grubu (n=10). Ön testlerden bir gün sonra KT Grubu'na ayak bileği ve peroneal kas grubunu kapsayan bir kas düzeltme tekniği uygulanırken, Plasebo-KT Grubu'na "I" şeklinde bir şekillendirme plasebo uygulaması yapıldı. Denge performansı Flamingo Denge Testi (FBT) ve Yıldız Ekskürsiyon Denge Testi (SEBT) ile değerlendirildi. Tüm testler uygulamadan hemen sonra tekrar edildi.

Sonuçlar: Grup içi analizlerde, KT Grubu'ndaki SEBT sonuçlarında, istatistiksel olarak anlamlı bir iyileşme saptanırken ($p<0,05$), FBT sonuçlarında anlamlı bir iyileşme olmadığı belirlendi ($p>0,05$). Plasebo-KT Grubu'nun, grup içi ve KT Grubu ile Plasebo-KT Grubu arası analizinde SEBT ve FBT skorları için istatistiksel olarak anlamlı bir fark bulunmadı ($p>0,05$).

Tartışma: KT uygulamasının dinamik dengeyi iyileştirmede etkili olduğu bulunurken, statik denge performansını iyileştirmeye etkisi olmadığı saptanmıştır.

Anahtar Kelimeler: Denge; Dans; Kinezyobant.

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INTRODUCTION

Dance is a unique combination of artistic skill and athletics (1). During their performances, dancers use their bodies as instruments to implement the dance in an artistic form. The quality of dance depends on the dancer's physical characteristics and skills. Therefore, a dancer needs good balance skills and coordination, improved spatial awareness, and a powerful rhythm sense for performing well (2,3).

As a harmonious and unifying couple dance form, salsa dance is performed by a leading dancer and a follower dancer who improvise various movement combinations. Ended steps in repetitive rhythm cause constant displacement of body weight during salsa dance. Those displacements of body weight could happen in forward, back, forward cross, and backcross directions. It is thought that the demands for static balance increases while maintaining the distance between partners during repetitive stepping and shifting the body weight through different directions. Additionally, dancers may need dynamic balance control while controlling their posture during the turning and shifting moves.

Good postural control is one of the basic needs of dancers for a controlled and elegant performance (4). Therefore, improving the proprioceptive system, which is essential for maintaining postural control, may be the key factor for improving a dancer's performance. Few studies investigate the balance performance of dancers. Some studies concluded that enhanced balance improves dance performance (5) and reduces the risk of injury (6). However, most of those studies are studied in ballet or modern dance populations (5,7). There is limited literature about social dancing like salsa dance.

Kinesiotaping (KT) is an alternative taping technique that can be used after orthopedic, neurological, and pediatric disorders and surgery for supporting the other physiotherapy applications. Supporting the muscle tissue around joints by using KT, could increase the strength of the muscle and stabilization of the joint and achieve the joint movements more easily (8). While some studies support that tissue tension can be decreased, and proprioception can be increased due to the inhibition of tissues by reducing the pressure on muscle, tendons, ligament, and nerve tissues, others support that there is no effect of KT both on eccentric and concentric muscle strength and joint proprioception (9-12). Furthermore, some studies suggest that KT applications may reduce dance-related injuries associated with overuse in dance populations (13). However, there is a limited number of studies that investigated the effect of KT application dance population, especially in social dance.

The ankle is an important joint in dancing due to the demand for high precision ankle movements under exceptional, repetitive loads in extreme positions (14). Therefore, it might be reasonable to apply KT to the ankle joint. Consequently, this study aimed to investigate the acute effects of the KT application to the ankle joint of amateur salsa dancers on balance performance.

METHODS

Study Design

The study was designed as a pretest-posttest, single-blind randomized placebo-controlled trial with two groups; KT Group (n=10, 6 females and 4 males), Placebo-KT Group (n=10, 5 females and 5 males).

Participants

A total of 20 amateur salsa dancers (11 females and 9 males, mean age=26,35±4.74 years) who has been performing salsa dance in Gaziantep Latin Park Dance Academy for at least six months, voluntarily participated in the study. Participants were divided into two groups by using a sealed envelope randomization method. The study was performed between January 2015 and May 2015. The study was approved by the Gaziantep University Ethics Committee of Clinical Research (Approval Date: 10.11.2014 and Approval Number: 2014/350) and was conducted following the Declaration of Helsinki on the use of human participants. Before the study, all dancers were informed about the purpose and risks of the study, and we took their written informed consent.

Each participant filled out a survey on demographical status, medical history, and dance

activity patterns before the study. Participants were included in the study according to their answers about injury condition on the survey. Dancers who have any health problems (musculoskeletal soft tissue injuries such as lower and upper limb pain, swelling, limitation of movement, systemic problems, neurological disorders or upper and lower respiratory tract infection) within at least one month, and have salsa dance experience less than six months were excluded from the study.

Procedures

All participants visited the dance studio three times per a week when the measurements were taken. The purpose of the first visit was familiarization of the balance tests, the second visit was for the pre-test measurements and taping application, and the third visit was for the post-test measurements. Anthropometrics measurements and balance tests were taken at the same time of day (6:00-9:00 pm) and under the same conditions. For minimizing the fatigue effect, the measurements were taken 48 hours after the last dance performance. Participants were asked to avoid drinking or eating before three hours before measurements.

Anthropometric Assessment

Anthropometric measurements were performed to determine the physical characteristics of the participants. For this purpose, leg length, height, and body weight were measured, and body mass index (BMI) of participants was determined according to the Anthropometric Standardization Manual (15). The BMI was calculated by using the formula: BMI=kg/m^2.

Balance Tests

Flamingo Balance Test (FBT) was used to determine the static balance (Figure 1). Participants stood on a 50 cm long, 5 cm height and 3 cm wide wooden beam with their dominant leg and asked to maintain balance for 1 minute while holding the free leg close to buttocks. The investigator paused the stopwatch each time participants lost balance and started it again after the participants regained balance on the beam. When the test time was over, the total number of falls or loss of balance in 1 minute was recorded as the dancer's FBT score (16). Star Excursion Balance Test (SEBT) was used to determine the dynamic balance (Figure 2). Participants stood in the middle of a grid laid on the floor, with eight lines extending at 45° angles from the center of the grid. Each direction was labeled according to the direction of excursion in relation to the standing leg. Participants were asked to maintain a single-leg stance on the dominant leg while reaching with the free leg to touch as far as possible along the chosen line. The foot was only allowed to touch lightly. Then, the participant returned to the bilateral stance. The touching point was marked by the investigator and measured manually using a measuring tape. Participants performed three trials in each direction. Ten seconds of rest was provided between individual reach trials. The greatest reach distance of three trials for each reach direction was used for the analysis (17). Previously measured leg length was used to normalize excursion distances by dividing

Figure 1: Flamingo Balance Test.

Table 1: Participants' Physical Characteristics and Training Levels in Kinesiotaping and Placebo Kinesiotaping Groups.

Variables	KT Group (n=10)	Placebo-KT Group (n=10)	p$^{\phi}$
	Mean±SD	Mean±SD	
Age (years)	25.30±4.54	27.40±4.92	0.467
Height (cm)	172.50±7.77	170.50±9.67	0.496
Weight (kg)	63.74±11.97	68.00±12.90	0.540
BMI (kg/m^2)	21.29±2.42	23.19±2.49	0.150
Dominant Leg Length (cm)	90.90±6.57	88.60±6.14	0.494
Training Time (months)	29.40±25.05	11.50±13.36	**0.047***
Training Frequency (days)	3.40±1.34	2.60±1.17	0.184
Training Duration (min)	462.00±302.05	231.00±135.68	0.074

*p<0.05. $^{\phi}$Mann Whitney U test. KT: Kinesiotaping, BMI: Body Mass Index.

the distance reached by leg length then multiplying by 100.

Before the balance tests, dancers did a 5-minute standardized general warm-up protocol. After the warm-up period, the participants were asked to try the test positions only once to avoid fatigue, and then tests were applied randomly for each participant to eliminate the learning bias. The participants were asked to perform all balance tests by using their dominant legs. The dominant leg was considered the leg that a person would use to kick a ball the farthest (18). All participants were tested barefoot. Five minutes of rest was allowed between FBT and SEBT.

Kinesiotaping Application

A muscle correction technique that covers the distal areas of peroneal muscle groups and lateral and medial malleolus of the ankle was applied to KT Group one day after the pre-tests. Five minutes after the taping application, balance tests were applied. Participants were informed about cleaning the skin area to which kinesiotaping was applied and not using any intermediate material like cream, one day before taping application. The tests were repeated under the same temperature and room conditions.

Two tapes cut 50 cm long were used for the application. One of the bands was started to tape from the lateral region of the leg and proceeded to distal of peroneal muscles and lateral malleoli with no tension. Then, the taping process has been continued from the lateral side to the medial side of the foot sole with 50% tension. After the medial side of the foot has been covered, the tension was cut. Application continued with original stretching of tape through the diagonal line, and was ended in front of the foot. The same application was repeated from the medial side to the lateral side of the foot sole. Consequently, a muscle correction technique was created by covering the ankle and exposing the heel (19) (Figure 3).

A placebo kinesiotaping application was performed

Figure 2: Star Excursion Balance Test.

for the Placebo-KT Group in the study. To provide a placebo effect, a 15 cm length "I" shaped tape was used and applied on to the skin from tuberosity of the to along the without any tension (20) (Figure 4).

Statistical Analysis

We calculate the power of the study by using post-hoc power analysis via the G*Power package software program (G*Power, Version 3.0.10, Franz Faul, Universität Kiel, Germany). According to the FBT results of 20 participants, the power of the study was found 63% for alpha=0.05 and effect size=0.47. Data analyses were conducted using IBM SPSS version 21.0 for Windows (IBM Corporation, Armonk, New York, USA). The variables were investigated using analytical methods to determine whether or not they were normally distributed. Intragroup and intergroup comparisons were analyzed by Man Whitney U test and Wilcoxon signed-rank test, respectively. Statistical significance was set at $p<0.05$.

RESULTS

The mean age of the dancers (n=20) was 26.35±4.73 (min-max=19-38) years. The mean height and weight were 171.50±8.60 (min-max=158-186) cm and 65.87±12.31 (min-max=47-91) kg, respectively. The dancer's BMI was 22.24±2.58 (min-max=17.40-26.90) kg/m^2. Only the dominant sides of the participants in the study were taken into consideration. In the study, while four participants were left side dominated, 16 participants were right side dominated. The mean dominant leg length was 89.75±6.30 (min-max= 80-104) cm. The mean training span was 20.45±21.59 (min-max= 6-72) months. The mean frequency of salsa practice sessions was 3.00±1.30 (min-max=1-5) days, and the mean duration was 346.50±256.87 (min-max=60-960) minutes. We found no differences between the groups regarding the participant's physical characteristics, and training frequency and duration ($p>0.05$, Table 1). Training time was significantly higher in the KT Group than the Placebo KT Group ($p<0.05$, Table 1).

There was a significant difference between pre- and post-test SEBT in anterior, posteromedial, posterolateral, lateral, and anterolateral directions in the KT Group ($p<0.05$, Table 2). Pre-test and post-test SEBT outcomes showed no difference for the Placebo KT-Group ($p>0.05$, Table 2). No differences were found for intergroup comparisons regarding SEBT ($p>0.05$, Table 2). We found no significant differences in both intergroup and intragroup comparisons regarding FBT ($p>0.05$, Table 2).

DISCUSSION

This study is the first study to explore the effects of ankle KT on balance performance among non-professional Salsa dancers. The results of this study revealed significant improvements in dynamic balance performance of KT Group compared to the Placebo-KT Group. On the other hand, there were

Table 2: Comparisons of Pre-test and Post-test Results of Flamingo Balance Test and Star Excursion Balance Test in Kinesiotaping and Placebo Kinesiotaping Groups.

Variables	KT Group (n=10)		p^{ϕ}	Placebo-KT Group (n=10)		p^{ϕ}	p^{δ}
	Pre-test	Post-test		Pre-test	Post-test		
	Mean±SD	Mean±SD		Mean±SD	Mean±SD		
Flamingo Balance Test (n)	8.10±1.91	8.50±3.03	0.201	9.10±2.28	9.00±2.10	0.705	0.760
Star Excursion Balance Test-Reaching Directions (cm)							
Anterior	74.80±7.07	75.30±7.05	**0.012***	76.35±6.24	76.42±6.03	0.593	0.821
Anteromedial	76.87±6.58	76.93±6.39	0.398	79.10±6.55	79.16±6.56	0.919	0.344
Medial	79.23±9.45	79.38±9.59	0.610	84.14±8.63	83.98±8.41	0.646	0.212
Posteromedial	79.50±9.17	81.18±9.76	**0.008***	83.35±8.51	83.10±8.43	0.475	0.650
Posterior	79.38±9.22	80.67±8.84	0.212	83.06±8.43	82.98±8.68	0.798	0.364
Posterolateral	79.23±9.06	80.88±8.90	**0.007***	83.00±8.67	82.81±8.84	0.721	0.597
Lateral	75.22±6.65	76.08±6.62	**0.040***	77.41±6.16	77.50±6.62	0.683	0.597
Anterolateral	73.32±7.00	74.43±6.52	**0.008***	74.35±6.09	74.43±6.69	0.610	0.940

*$p<0.05$. $^{\phi}$Wilcoxon signed rank test. $^{\delta}$Mann Whitney U test. KT: Kinesiotaping.

Figure 3: Kinesiotaping Muscle Correction Technique.

no improvements in static balance performance for both groups.

As well as artistry, technique, and expression, the dancer's ability to remain in equilibrium is vital to have a successful performance (2,3,21). In salsa dance, moves are especially challenging for postural control and muscle strength due to frequent changes in direction and the dance steps performed on the forefoot and toes (22). Lower limb characteristics, specifically stability, the range of motion, and muscle strength, enable dancers to perform his/her potential or may restrain their performance when those characteristics limited due to an injury (23). Apart from those, joint proprioception is also crucial for the dancer's motion coordination. Chang et al. (24) suggested there is a significant correlation between the perception of the dancers and the biomechanical precision of their movements. Therefore, determining the different factors that may affect dance performance is essential for protecting a dancer's health and improving the technique of the dance. In literature, proprioception (19,24), and balance exercises (25) are widely studied in dance medicine but mostly conducted within the modern dance population.

The current empirical data on performance-related effects of kinesiotaping in healthy subjects are contradictory. Some studies have reported that KT has no effect on jumping and dynamic balance performance (26,27) and does not increase the maximal isokinetic strength of the knee (11). While some other studies have shown that KT increases static balance, proprioception, and maximum muscle strength (28-31). Nunes et al. (26) compared KT to the triceps surae to sham tape with three comparisons using SEBT in healthy college athletes. They found that the KT technique did not produce any significant effect on dynamic balance performance. Wilson et al. (27) compared KT to no tape with four comparisons using Dynamic Stability Index measurements, and they also found no significant difference in dynamic balance performance between the groups. However Aytar et al. (31) found an improvement in static balance during KT application to the quadriceps muscle in

Figure 4: Placebo Kinesiotaping.

women with patellofemoral pain syndrome. The reason for inconclusive evidence might be due to methodological differences between the studies, such as; tape application types, inclusion criteria, measurement protocols.

The current evidence on KT usage in dancers is limited (13,19). In our study, KT application to ankle significantly increases the dynamic balance, measured using SEBT acutely. On the other hand, we found no significant difference in static balance, measured using FBT.

Tekin et al. (19) explored the outcomes of balance training and KT usage in the modern dance population. While they found significant improvements for all dynamic balance tests in both balance training and KT groups, they did not detect any significant changes in static balance outcomes for the KT group. In our study, we also found significant changes in dynamic balance but no difference in static balance. We also thought that one possible explanation for the better results in dynamic balance rather than static balance might be psychological benefits of the tape (19). The KT application might boost the dancer's confidence, and they might believe their ankle is more secure and stable. However, KT has elastic properties, and so it might improve functional stability through proprioception and muscle activation instead of mechanical support (32). Unlike KT's promising effect on dynamic balance, we found no difference in static balance performance. Therefore, the KT application may facilitate short-term dynamic balance performance but not static balance performance in non-professional salsa dancers. We thought that the increased frequency of application or more extended wearing periods might be used to achieve better results in static balance performance.

There are several limitations to this study. As a recreational activity, Latin dances are relatively new in Turkish culture, and for this reason, the number of participants was relatively low. Number of males and females were unequal in favor of female participants.

In conclusion, the results of the present study revealed that KT application with muscle correction technique to amateur salsa dancer's ankle improved dynamic balance performance. On the other hand, we found no improvement in static balance performance. The KT applications to the ankle, could prevent injury mechanisms that may occur during the training of amateur dancers, and help to improve the dancer's performance by providing an acute increase in dynamic balance performance.

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Conflict of Interest: There is no conflict of interest to declare.

Ethical Approval: The Ethics Committee for Clinical Research of Gaziantep University has approved the study (Approval Date: 10.11.2014 and Approval Number: 2014/350).

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