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Original Research Article

Spinal posture in different DanceSport dance styles compared with track and field athletes

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ABSTRACT

Background and objective: In DanceSport, athletes train for many years to develop a very specific posture. Presently there are few data as to whether these adaptations are habitual or cause permanent anatomical changes to the spine. The aim of the current study was to evaluate lumbar lordosis and thoracic kyphosis of the international level DanceSport dancers using track and field athletes as controls.

Materials and methods: Thirty competitive DanceSport couples (15 men aged 23.4 ± 6.6 years; 15 women aged 22.5 ± 6.4 years) and 29 track and field athletes (16 mean aged 27 ± 4.4 years and 13 women aged 22 ± 4.1 years) volunteered. Twelve couples were Standard, 7 Latin American and 11 were Ten Dance couples. Thoracic kyphosis and lumbar lordosis angle were assessed in lateral view using a Vertebral Fracture Assessment scan.

Results: DanceSport athletes had smaller S-shaped vertebral curvatures compared to track and field athletes. Male (5.7 ± 4.7°) and female dancers (8.7 ± 5.9°) had significantly smaller lumbar lordosis angle compared to their track and field counterparts (22.3 ± 9.9° for men; 20.3 ± 5.9° for women). Female dancers (25.3 ± 8.0°) also demonstrated significantly smaller thoracic kyphosis angle than female track and field (32.1 ± 8.9°) participants. It was further revealed that female Latin American dancers had significantly smaller lumbar lordosis values (3.7 ± 3.1°) compared with female Standard (10.7 ± 6.1°) and Ten Dance dancers (9.7 ± 5.5°).

Conclusions: The results of the present study suggest that smaller S-shaped vertebral curvatures of DanceSport athletes compared with track and field athletes are permanent changes rather than habitual.

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1. Introduction

International DanceSport requires dancing in couples and competing in Standard, Latin American or Ten Dance disciplines [1]. The shape of the posture and partners' dance hold is very important in all three DanceSport disciplines. The physiological demands of Latin American competitive dances are greater than the Standard Dance equivalents, especially in female dancers [2]. The correct posture requires the neck and spine to be elongated, the abdominal muscles are pulled in, hips are rotated forward, shoulders are lowered, and the weight is held more forward on balls of the feet [3]. In Standard dances, the female is poised backwards from the waist so that spine is arched back away from the partner [3,4]. To be able to keep this posture during competitions dancers are training it many years.

DanceSport competition combines athletic performance and esthetic values [1]. This can be observed within their posture on and off the dance floor. As posture is such a fundamental aspect of DanceSport competition, dancers spend a considerable amount of training developing the appropriate posture and dance hold. This raises the issue as to whether these adaptations are habitual or cause permanent anatomical changes to the spine.

The normal spine has curves that develop during growth periods and are influenced by stresses placed upon it during work and activities [5–7]. The function of these spinal curves is to increase the overall strength of the vertebral column and to help maintaining of the balance in the upright position [6]. They also facilitate to absorb stresses placed on our bodies through impact activities such as running and jumping [6]. The curves are described as convex (kyphosis) or concave (lordosis) to illustrate the direction of the arch in relation to the hollow or depressed side of the curve [8].

Physical activity influences developing of the spinal curvatures [7,9]. Sagittal spinal curvatures may adapt gradually following long and intensive training periods [9]. Training volume, specific and repetitive movements, type of sport and postures of each sport have been found to be associated with developing spinal curvatures [7,9]. During periods of stature growth, the sagittal configuration of the spine changes with an increase in thoracic kyphosis and lumbar lordosis [7]. Wojtys et al. [7] reported that athletes between 8 and 18 years of age demonstrated larger angles of thoracic kyphosis and lumbar lordosis and these angles were associated with cumulative training time. Lack of physical activity is associated with smaller curves [7]. Although the effects of hyperlordosis or hypolordosis are not yet well established, the loss of lumbar lordosis can have significant adverse effects [10,11]. Altered lumbar lordosis may cause disk degeneration and radicular pain [12], while increased lumbar lordosis and diminished abdominal muscle force can increase the risk of chronic low back pain [10].

The aim of the current study was to evaluate lumbar lordosis and thoracic kyphosis of the international level DanceSport dancers and compare it with track and field athletes. In this study track and field group was used as physically active control group. We decided to compare DanceSport with track and field athletes to exclude the influence of sedentary lifestyle. The reason for choosing precisely track and field athletes was that both sports are having continues and various movements. In track and field, the posture is also important and the body position is trained but posture on track and field athletes bases on natural body position while DanceSport specific posture demands permanent hips rotation and spine extension.

2. Materials and methods

2.1. Participants

The DanceSport and track field groups were matched for age and gender. Sixty competitive DanceSport athletes (30 couples) – amateur or qualified professionals – served as subjects for this study. Twelve couples were Standard, 7 Latin American and 11 were Ten Dance couples. Dancers belonged to the top 6% of the athletes listed in the world rankings [13]. All subjects were healthy, injury free and involved in full intensity training and competing at an international level during the testing period. The dancers averaged 15 ± 5.1 years of training and were presently training for 12 ± 6.3 h per week (Table 1).

Table 1 – Mean (±SD) anthropometrical characteristics, spinal curvatures, training experience and training volume of male and female dancers in different dance styles.

	Standard		Latin		10 dance	
	Male (n = 12)	Female (n = 12)	Male (n = 7)	Female (n = 7)	Male (n = 11)	Female (n = 11)
Age (years)	26.7 ± 8.3	25.3 ± 8.4	21.5 ± 2.3	21.1 ± 3.1	19.4 ± 2.7[½]	19.0 ± 3.3[½]
Height (m)	183.4 ± 3.6	170.9 ± 4.3[*]	175.4 ± 3.7[#]	162.7 ± 4.6[*,#]	180.4 ± 6.6	166.6 ± 4.5[*,½]
Body mass (kg)	72.5 ± 4.6	57.3 ± 5.0[*]	70.0 ± 5.1	53.4 ± 4.4[*]	72.3 ± 8.2	55.5 ± 4.0[*]
Thoracic kyphosis (°)	25.8 ± 10.8	24.8 ± 9.1	24.3 ± 4.9	24.9 ± 7.8	21.3 ± 10.3	26.2 ± 7.5
Lumbar lordosis (°)	5.9 ± 5.8	10.7 ± 6.1	6.1 ± 3.6	3.7 ± 3.1[#]	5.2 ± 4.2	9.7 ± 5.5[¤,*]
Years of training	16.8 ± 7.9	15.8 ± 5.5	13.5 ± 8.5	15.5 ± 8.1	12.8 ± 3.9	13.2 ± 3.5
Training volume (h/w)	11.7 ± 4.7	12.1 ± 5.7	13.4 ± 10.1	16.2 ± 9.4	10.3 ± 5.8	10.7 ± 5.7

[*] Significant difference at $P < 0.05$ between males and females in the same dance style.
[#] Significant difference at $P < 0.05$ between Standard and Latin dancers of the same gender.
[½] Significant difference at $P < 0.05$ between Standard and 10 dance dancers of the same gender.
[¤] Significant difference at $P < 0.05$ between Latin and 10 dance dancers of the same gender. h/w: hours per week.