

Original research

Morphological characteristics of the young scoliotic dancer



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ABSTRACT

Background: The literature lacks important data about the relationship between scoliosis and growth process, scoliosis and intensive exercise, scoliosis and morphological characteristics, and scoliosis and injuries, among young dancers.

Objective: The aims of the present study were to determine the extent to which dance experience, body structure, anatomical anomalies and injuries are associated with scoliosis, and to identify variables able to discriminate between scoliotic and non-scoliotic female dancers at time of screening.

Design: Cross-sectional cohort study.

Methods: One thousand two hundred and eighty-eight non-professional female dancers, aged 8–16 years, were screened for the current study. We determined their morphometrical profile (height, weight, BMI), dance discipline (as hours of practice per week), manifestation of anatomical anomalies, and existing injuries. All dancers were clinically examined for presence of scoliosis.

Results: Three hundred and seven of the 1288 dancers (23.8%) were diagnosed as having scoliosis. Dance experience and body structure were similar for dancers with or without scoliosis. Scoliotic dancers presented a significantly higher prevalence of anatomical anomalies (such as genu varum, and hallux valgus). Back injuries were more common among scoliotic dancers compared to non-scoliotic dancers.

Conclusion: Screening and identifying the young scoliotic dancers prior to their advancing to higher levels of exercise is recommended. The scoliotic dancers should realize that there might be a connection between the presence of scoliosis and increased incidence of anatomical anomalies and back pain, hence, it should be suggested they seek help with an adequate assessment and exercise rehabilitation program.

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1. Introduction

A variety of musculoskeletal disorders have been described in athletes (Owoeye, 2010; Tanaka et al., 2010) and in dancers (Bronner, Ojofeitimi, & Spriggs, 2003) which may significantly impact their performance and future profession. Scoliosis is a common disorder among children and adolescents. Yilmaz, Zateri, Vurur and Bakar (2012) recently reported that prevalence of scoliosis ranged from 1% to 2% among school children (6–15 years old) (Yilmaz et al., 2012). That prevalence of scoliosis is higher for children participating in sports activities, and especially for athletic

girls compared to their age-matched non-athletic controls (Modi, Srinivasalu, SMehta, Yang, Song, & Suh, 2008; Tanchev, Dzherov, Parushev, Dikov, & Todorov, 2000). Although that phenomenon may have significant impact on the careers of young dancers (Warren, Brooks-Gunn, & Hamilton, 1986), the literature lacks important data mainly regarding the following: a) the relationship between the growth process, intensive exercise and scoliosis; b) how scoliosis in young dancers may affect their physical behavior during dancing; c) how prone scoliotic dancers are to injury and if so, of what type.

Dance is a very popular sports activity among girls during childhood and adolescence, the critical periods of growth and maturation. The interaction between growth processes, intensive exercise and scoliosis is not clear: Dickson (1999) for example suggested that intensive exercise may improve scoliosis, while Kenanidis, Potoupnis, Papavasiliou, Sayegh, and Kapetanos (2010) claimed that exercise may worsen scoliosis. As dance is a highly

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repetitive sporting activity that imposes high stress on the immature spine, the risk of curvature of the spine structure increases (Omey, Micheli, & Gerbino, 2000; Warren et al., 1986). Furthermore, the stresses exerted on the scoliotic spine over many years may be associated with an increased incidence of specific injuries among scoliotic dancers (Kenanidis, Potoupnis, & Papavasiliou, 2008; Kenanidis et al., 2010).

The question of whether scoliosis is related to other anatomical anomalies is barely discussed in the literature (Burwell et al., 2008). Postural modifications such as knee or foot misalignment are often found in athletes (Yaniv, Becker, Goldwirt, Khamis, Steinberg, & Weintroub, 2006) and in dancers (Hamilton et al., 2006). In this stage of physical growth, posture undergoes many adjustments and adaptations due to changes in proportions (Penha, João, Casarotto, Amino, & Penteado, 2005) and to sports-related musculoskeletal demands during growth (Yaniv et al., 2006).

As only little is known about young non-professional female dancers, two aims were set for the present study: evaluating the prevalence of scoliosis among this group of dancers, and comparing the morphological characteristics and injury pattern of scoliotic dancers compared to non-scoliotic dancers at time of screening.

2. Methods

2.1. Subjects

A group of 1288 non-professional female dancers, aged 8–16 years (mean age = 13.3 years) were screened for the current study in the Israeli Performing Arts Medical Center, Tel-Aviv, Israel. The girls were active in a variety of dance styles, including classical ballet, modern dance, and jazz.

2.2. Screening

In Israel, the Ministry of Education and Culture has made a screening program compulsory for young females enrolling in a dance school, or prior to their acceptance to a high school dance program or to a dance company. In practice it occurs that each dancer was recruited only once for a screening (over the past 15 years) during which time she was interviewed, and examined

physically by the physician for scoliosis, body structure measures, anatomical anomalies, and current injury.

The screening consisted of 5 steps, as listed below:

- 1. Interview** – Each girl was interviewed (by S.I. and S.N.) to define her biological profile and dance experience. The current age (age at screening) of each dancer was determined by omitting the date of birth from the date of examination [(date of examination – date of birth)/365]. Each age cohort (8, 9, 10, etc.) ranged between -0.49 and $+0.50$ (7.51–8.5 = 8 years old, etc.). Age onset of menarche was determined by asking the dancer and her parents the accurate age of onset, in ranges of 6 months (8, 8.5, 9, 9.5 etc.) To determine the dance experience of each dancer, the dancer and her parents were asked about her age at onset of dance classes in ranges of 6 months (5, 5.5, 6, 6.5, etc.), her number of years of practice (age at screening – age onset dance classes), and hours of practice per week (total hours of practice for classical ballet, modern dance, Jazz, and other).
- 2. Presence of scoliosis:** With structural scoliosis, the vertebral bodies rotate to the convexity of the curve and become distorted. If the thoracic spine is involved, this rotation causes the ribs on the convex side of the curve to push posteriorly, causing a rib "hump" and narrowing the thoracic cage on the convex side. As the vertebral body rotates to the convex side of the curve, the spinous process deviates toward the concave side. The ribs on the concave side move anteriorly, causing a "hollow" and a widening of the thoracic cage on the concave side (Magee, 1992; p. 222).

To identify scoliosis, the Adams forward-bend test (Adams, 1965), and Magee's 'skyline' view (Magee, 1992) were used by one of the authors (S.I.) for all dancers. First, all dancers underwent the Adams forward-bend test, that was conducted by asking the dancer to flex her spine forward from a standing position. The examiner observed from behind, studying the contours of the back, and looking for a hump on one side and a hollow on the other. A positive test means that a rib hump deformity is noted in the thoracic region, or that an angle of trunk rotation is evident in the thoracolumbar or lumbar region (Fig. 1A).

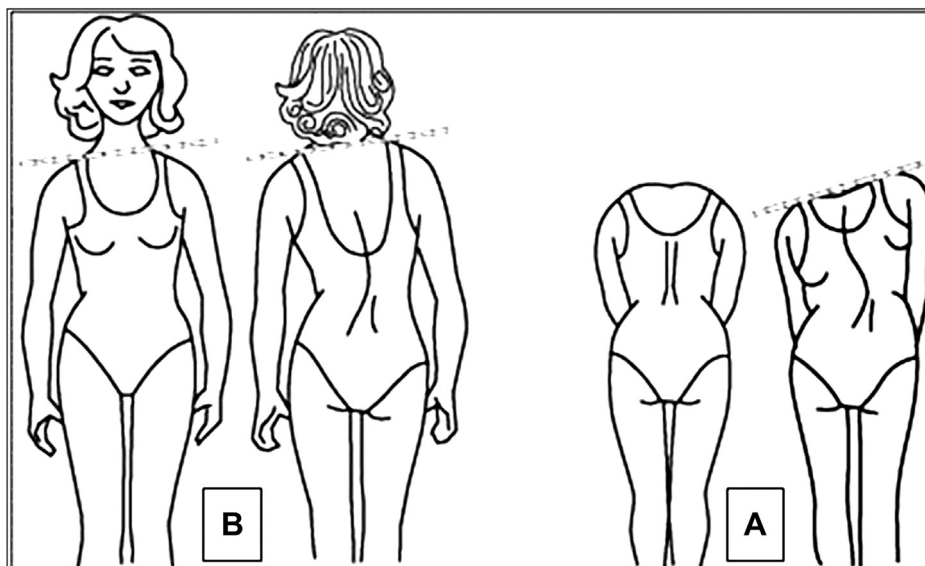


Fig. 1. The Adams forward-bend test (A), and Magee's 'skyline' view (B).

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