



Original article

Effect of a physical conditioning versus health promotion intervention in dancers: A randomized controlled trial



Nathalie A. Roussel ^{a, b, *}, Dirk Vissers ^a, Kevin Kuppens ^{a, b}, Erik Fransen ^c, Steven Truijen ^a, Jo Nijs ^b, Wilfried De Backer ^{d, e}

^a University of Antwerp, Faculty of Medicine and Health Sciences, Department of Physiotherapy (REVAKI), Antwerp, Belgium

^b Pain in Motion International Research Group, Vrije Universiteit Brussel, Faculty of Physical Education & Physiotherapy, Department of Human Physiology, Brussels, Belgium

^c StatUa, Centre for Statistics, University of Antwerp, Belgium

^d University of Antwerp, Faculty of Medicine, Antwerp, Belgium

^e Department of Respiratory Medicine, Antwerp University Hospital, Antwerp, Belgium

ARTICLE INFO

Article history:

Received 6 September 2013

Received in revised form

9 April 2014

Accepted 22 May 2014

Keywords:

Pain

Exercise

Motor control

Dance

ABSTRACT

Although dancing requires extensive physical exertion, dancers do not often train their physical fitness outside dance classes. Reduced aerobic capacity, lower muscle strength and altered motor control have been suggested as contributing factors for musculoskeletal injuries in dancers. This randomized controlled trial examined whether an intervention program improves aerobic capacity and explosive strength and reduces musculoskeletal injuries in dancers. Forty-four dancers were randomly allocated to a 4-month conditioning (i.e. endurance, strength and motor control training) or health promotion program (educational sessions). Outcome assessment was conducted by blinded assessors. When accounting for differences at baseline, no significant differences were observed between the groups following the intervention, except for the subscale “Pain” of the Short Form 36 Questionnaire ($p = 0.03$). Injury incidence rate and the proportion of injured dancers were identical in both groups, but dancers following the conditioning program had significant less low back injuries ($p = 0.02$). Supplementing regular dance training with a 4-month conditioning program does not lead to a significant increase in aerobic capacity or explosive strength in pre-professional dancers compared to a health promotion program without conditioning training, but leads to less reported pain. Further research should explore how additional training may be organized, taking into account the demanding dance schedule of pre-professional dancers.

The trial is registered at ClinicalTrials.gov, number NCT01440153.

© 2014 Elsevier Ltd. All rights reserved.

1. Introduction

Professional dancing is a heavy physical exertion, requiring almost perfect control of technical skills, combined with good physical fitness (i.e. the ability of an individual to meet the demand of a specific physical task) (Koutedakis and Jamurtas, 2004). Several studies have evaluated selected parameters of physical fitness, such as aerobic and anaerobic capacity, muscular strength, flexibility and motor control in dancers and it appears that dancers are not as

well-conditioned as other athletes (Koutedakis and Jamurtas, 2004; Angioi et al., 2009; Koutedakis et al., 2009; Twitchett et al., 2009).

Dancers, as athletes, experience a high incidence of injuries, with a cumulative injury incidence ranging from 17 to 94% (McMeeken et al., 2001; Hincapie et al., 2008). Especially soft tissue injuries in ankle/foot, knee, hip and lower back region, of mild to moderate severity, are reported (Byhring and Bo, 2002; Hincapie et al., 2008; Roussel et al., 2009; Baker et al., 2010; Echegoyen et al., 2010). The longer periods of sick leave, which may be detrimental for their career (Nilsson et al., 2001), motivated researchers to search for potential risk factors.

For example, lower oxygen uptake (VO_2), reflecting reduced aerobic and anaerobic capacity, has been observed in both professional, pre-professional (i.e. full-time enrolled in a Dance degree, university level) and adolescent **ballet** (classic) dancers and in pre-

* Corresponding author. Faculty of Medicine and Health Sciences, University of Antwerp, Universiteitsplein 1, 2610 Wilrijk, Belgium. Tel.: +32 3 821 46 99; fax: +32 3 265 25 01.

E-mail address: nathalie.roussel@uantwerpen.be (N.A. Roussel).

URL: <http://www.paininmotion.be>

professional **contemporary** (modern) dancers (Koutedakis and Sharp, 1999; Baldari and Guidetti, 2001; Angioi et al., 2009). Routine dance classes are considered as an intermittent type of exercise and may not provide sufficient stimuli to improve aerobic/anaerobic capacity (Cohen et al., 1982; Schantz and Astrand, 1984; Twitchett et al., 2009).

Muscle strength also appears to be an important parameter when considering musculoskeletal injuries in dancers. Reduced strength levels were associated to injuries of the lower extremities and the spine: the weaker the dancer, the greater the injury risk (Koutedakis et al., 1997a, 1997b).

Several studies have revealed the high prevalence of hypermobility and increased flexibility in dancers (Gannon and Bird, 1999; McCormack et al., 2004). Evaluating the quality of movement (e.g. motor control) could be more important than quantifying movement in hypermobile individuals (Simmonds and Keer, 2007). In a prospective study, generalized joint hypermobility was not associated with increased injury risk, while dancers with impaired motor control were at risk to develop injuries during the 6-month follow-up (Roussel et al., 2009). Altered motor control has furthermore been demonstrated in dancers with low back pain (LBP) (Roussel et al., 2013). Nevertheless, no study has examined the effect of motor control training in dancers.

Advantages of physical fitness programs have often been suggested to meet the demands of a choreography and reduce the injury risk (Khan et al., 1995; Koutedakis and Jamurtas, 2004; Wyon et al., 2004; Wyon and Redding, 2005; Angioi et al., 2009). However, only a few studies have investigated the effects of these programs in dancers. This may be explained by the unfounded opinion that strength training would alter dancers' aesthetic appearances (Koutedakis and Jamurtas, 2004; Koutedakis and Sharp, 2004; Koutedakis et al., 2007). A twelve week aerobic and strength training program not only increased the aerobic capacity, but also improved dance-related performances in pre-professional contemporary dancers without interfering with aesthetic or artistic requirements (Koutedakis et al., 2007). Two studies evaluated the effect of additional fitness training on musculoskeletal pain in dancers, but were uncontrolled (Mistiaen et al., 2012) or performed in small samples (Ramel and Moritz, 1994).

We performed a randomized controlled study to compare the effect of a conditioning program with a health promotion intervention on aerobic capacity, muscle strength and musculoskeletal injuries in pre-professional dancers. We hypothesized that offering a conditioning program, consisting of aerobic capacity, muscle strength and motor control training, in addition to dance classes would improve the aerobic capacity and muscle strength and decrease pain in dancers, compared to a health promotion program without active exercises.

2. Methods

2.1. Design

A randomized controlled trial (RCT) was organized in order to determine the effect of two interventions on aerobic capacity, muscle strength and musculoskeletal injuries in dancers. Participants were randomly allocated to the conditioning ($n = 23$) or health promotion intervention ($n = 21$) by manual randomization in a 1:1 ratio. In order to have the same number of men and participants with equal experience in each group, stratified randomization (gender and dance experience, i.e. first, second or third year of Bachelor in Dance) was performed. The study protocol was approved by the University Institutional Review Board. Prior to participation, the participants received information

addressing the study nature and were asked to sign an informed consent.

2.2. Participants

Eligible participants (both men and women) were recruited among pre-professional dancers ($n = 47$) full-time enrolled at a Conservatoire (Bachelor of Dance). At the time the study took place, one student was staying abroad and two students were not full-time enrolled, therefore not meeting inclusion criteria. Forty-four dancers agreed to participate in the study.

2.3. Procedures

Body weight and height were measured at baseline using a medical digital column scale (SECA 701) and a stadiometer (SECA 225; seca GmbH & Co. KG, Hamburg, Germany) to calculate body mass index (BMI). Aerobic capacity and explosive muscle strength were evaluated on separate days to avoid bias due to muscle fatigue. These assessments were conducted by examiners blinded to group allocation and to the dancers' medical history. Injury registration occurred by another investigator only blinded to group allocation. The 4-month intervention program (conditioning versus health promotion program) was followed by a final assessment.

Aerobic capacity was examined using an incremental exercise test on an electronically braked bicycle ergometer (Ergoselect 100, Ergoline GmbH, Germany). Resistance started with 25 Watts and increased in 25 Watt increments until exhaustion. This test is reliable (Wallman et al., 2003) and has been used to test aerobic capacity in dancers in a previous study (Vissers et al., 2011). Electrocardiographic and ventilatory variables, including heart rate (HR) were monitored continuously (OxyconPro, Jaeger, Germany). Perceived exertion was scored every minute using Borg's 15-point ratings of perceived exertion scale (Chen et al., 2002).

Explosive muscle strength of the lower limbs was evaluated using the Standing Broad Jump test (Ortega et al., 2008). From a resting standing position, participants were asked to jump as far as possible. Two submaximal trials were performed after 5 min warming-up, followed by three maximal trials. The farthest jump was used in data analysis. Reliability of this test is acceptable (Ortega et al., 2008).

2.4. Questionnaires

A standardized questionnaire was used to collect demographic information (such as gender, age, sport) at baseline. The Short Form 36-questionnaire (SF-36) is a generic questionnaire that measures health status. Reliability, validity and responsiveness of the SF-36 have been demonstrated (Beaton et al., 1997). The Dance Functional Outcome Scale (DFOS) surveyed general daily activities (such as walking, stability, stairs) and dance-related functionality (such as dance specific movements, jumping, turning, kneeling, etc.) (Bronner et al., 2007). Fourteen questions are scored on a six-point scale. A higher score corresponds to a better functionality (Bronner et al., 2007). A preliminary study indicated high reliability, validity, and responsiveness of the DFOS when compared to the SF-36 (Bronner et al., 2003). The Baecke Questionnaire evaluates habitual physical activity (Baecke et al., 1982). Sixteen questions are scored on a five-point Likert scale, covering three domains: work, sports, and non-sports leisure activity. Reliability and validity of this questionnaire have been demonstrated (Pols et al., 1995). The visual analogue scale (VAS – 100 mm) was used for the assessment of musculoskeletal pain severity on the

Download English Version:

<https://daneshyari.com/en/article/5864665>

Download Persian Version:

<https://daneshyari.com/article/5864665>

[Daneshyari.com](https://daneshyari.com)