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PREVENTION & REHABILITATION: SYSTEMATIC REVIEW

The effect of Pilates exercises on body composition: A systematic review

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Systematic review;
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Summary Objective: The purpose of this systematic review was to determine how Pilates exercises have impacted body composition (BC) on selected populations.

Methods: A comprehensive literature search was performed using the keywords 'Pilates, body composition, systematic review, literature review, overweight, obesity, healthy weight, underweight' and their combination.

Results: Seven studies met the inclusion criteria and after further quality analyses it was determined that there is currently poor empirical quantitative evidence indicating a positive effect of Pilates exercises on BC. Several methodological flaws were observed in the studies analyzed, including few full-text published studies looking into the effects of Pilates exercises on BC, a lack of true experimental research designs, limited standardization in measurement techniques, insufficient or no control of the nutritional status, and inconsistent instructor qualifications.

Conclusion: Well-designed research is needed to determine how Pilates exercises impact BC on selected populations.

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Introduction

Measurement, assessment and monitoring of BC in humans have been three of the main challenges for health sciences professionals. Human body mass or weight is the broadest measure of body size and gives no information about metabolically active tissue such as muscle mass. Therefore,

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human BC refers to the assessment of the absolute and relative amounts of bone, muscle, and fat mass measured by different methods depending on the technology at hand (e.g., skinfold calipers, hydrostatic weighing, Dual-emission X-ray absorptiometry). From these variables, fat mass or body fat percentage has been the most important estimate for health purposes given the strong correlation with cardiovascular diseases (Heyward and Wagner, 2004; Wang et al., 1995; Yasumura et al., 2000). Genetics, behavior (e.g., sedentary lifestyle, tobacco and alcohol consumption), and several diseases (e.g., bulimia, anorexia), may negatively impact BC, where overweight, obesity, or a dramatic reduction of muscle mass, are some consequences of these conditions. For instance, children diagnosed with genetic nervous anorexia have shown anxious behavior associated with caloric restriction and low body mass index (BMI) (Dellava et al., 2010). More than 50% of the anorexic patients present with osteopenia at the time of examination (Fernández Soto et al., 2010). Also, a recent study by Thibault et al. (2010), links parental physical activity behavior to their offspring's increased risk for becoming overweight and obese adolescents. Indeed, the risk decreases when at least one of the parents has a physically active lifestyle.

These findings emerge after more than 80 years devoted to the study of overweight and obesity (Hartman and Ghrist, 1929; Prble, 1923; Terriy, 1923). Today, researchers continue in their efforts to understand how new exercise techniques might impact BC in humans. Although control or modification of the BC was not the primary motivation for Joseph Pilates in the early 30's; recently, his exercises and methods have become popular. Pilates created a body conditioning method first called 'Contrology' (Pilates and Miller, 1945). Pilates introduced this method in the United States between 1930 and 1940 (Anderson and Spector, 2000), attracting choreographers and dance instructors who used his exercises for rehabilitation. After Pilates' death in 1967, the method became more widely spread and was introduced to other areas, under the name 'Pilates' (Latey, 2001). Today, dancers, athletes, and other population use Pilates for rehabilitation and to increase their physical activity and fitness (Latey, 2001; von Sperling and Brum, 2006).

Pilates designed a comprehensive method of muscle stretching and strengthening with the goal of building a strong body under the philosophy of mind-over-body control. According to Lange et al. (2000), Pilates exercises provides benefits in physiological (e.g., resistance, strength, muscle power), psychological (e.g., mood, attention, motivation), and motor functions (balance, static and dynamic posture, general coordination). In spite of these purported effects, researchers have questioned the lack of scientific evidence supporting the use of this method for fitness and rehabilitation (Curnow et al., 2009; Da Fonseca et al., 2009; Sorosky et al., 2008; Sekendiz et al., 2007, von Sperling and Brum, 2006; Maher, 2004).

A review by Bernardo and Nagle (2006), demonstrated the effectiveness of Pilates exercises on strength and body alignment in dancers and gymnasts. Bernardo (2007), also showed Pilates effectiveness on flexibility, transversus abdominis activation, pelvic-lumbar stability, and muscular activity in healthy adults. However, this effectiveness

might be spurious due to methodological weaknesses, such as small sample size, the lack of true experimental research designs, selection bias, a poor validity and reliability of measurement instruments, as well as the lack of specific parameters for the application and description in the Pilates exercises used (i.e., description of the method). La Touche et al. (2008), found positive effects of Pilates exercises such as increased general function and pain reduction in patients with nonspecific low-back pain, and concludes that further research is needed to better understand what is the best combination of exercises and whether a dose-response relationship exists.

In a survey by von Sperling and Brum (2006), 18.4% of the subjects believed that regular practice of the Pilates method would increase lean mass and thus muscle tone. However, published scientific evidence on the effects of Pilates exercises on BC are scarce. Therefore, the purpose of this review is to determine the effectiveness of Pilates exercises on BC.

Material and methods

Literature search and inclusion criteria

A search concluded on March 20, 2010 using the following databases: PubMed, Medline, SporDiscus, EbscoHost, ScienceDirect, and Google Scholar. In addition, a manual search was done in journals such as *Journal of Bodywork and Movement Therapies*, *Medicine & Science in Sports & Exercise*, and the *International Journal of Obesity*. The keywords used were Pilates, body composition, systematic review, literature review, overweight, obesity, healthy weight, underweight, and their combination. A total of eight potential studies were located and reviewed for title, keywords and summary. These articles were further analyzed using either their full-texts or abstracts if that was the only available information.

Studies selected for analyses met the following criteria: a) BC changes (i.e., adipose tissue mass or body fat, muscle mass or fat free-mass, bone mass, residual mass and skin mass) determined by an intervention based on Pilates exercises; b) diverse populations; c) studies published before March 2010; d) unpublished documents such as thesis, dissertations, and presentations in congresses; e) peer-reviewed articles; and f) no language restriction.

Evaluation of study methodology

Methodological quality of the studies included in this review was determined by the Jadad Scale (Jadad et al., 1996). Two independent reviewers evaluated the quality of the studies using the same methodology. Disagreements between reviewers were resolved by a third reviewer.

Results

Studies selection

Eight studies were located that evaluated the effect of Pilates exercises on BC. The study by Rice (2009), was

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