Physical exercise as a treatment for adolescent idiopathic scoliosis. A systematic review

Stefano Negrini, Guido Antonini, Roberta Caraballo, Silvia Minozzi, Marco Monticone
ISICO (Italian Scientific Spine Institute), Milan - S.C. Orthopaedy & Traumatology, San Carlo Borromeo Hospital, Milan - Care & Research Institute, Don Gnocchi Foundations ONLUS, Milan - Cochrane Centre, Milan (Italy)

Introduction
While physical exercises (PEEs) as a form of therapy did enjoy a measure of popularity in the past and are still conducted in some countries, in more recent times the international scientific community has given them scant consideration. One reason for this may be that of the insipid citations, a possible reason for not using PEEs could be that they are not effective or, if they are, that their effectiveness has not been demonstrated. Therefore, it is possible that different results are obtained in different countries depending on the literature that is available in each of them, while peremptory and good-quality papers may not necessarily be the premise of peer-reviewed journals.

Aim of the study
Our aim was, after reviewing all the literature and verifying its validity to establish the current scientific knowledge on the effectiveness of PEEs as a treatment for AIS and to reach on this basis an evidence-based clinical conclusion.

Methods
We searched the Medline, Embase, Cochrane, and Cochrane Library databases from the dates of their inception to December 2002, without applying any language restrictions. Finally, we performed a hand-search of non-indexed journals from their inception to 2002. The inclusion criteria were the following: Patients: diagnosis of AIS, patients treated exclusively with PEEs. Experimental intervention: control intervention, outcome measure: Curve size, Cobb degrees. Study design: any study design (we evaluated the internal validity of the retrieved studies methodologically). The following factors were considered: randomization, allocation, blinding, study duration, prospective vs. retrospective, study sample, recruitment model, study description, intervention described, blinding of outcomes, identification of possible confounders, statistical control, and the funding source.

Results
17 papers were found out of 576 considered. Design of selected studies: randomized 5, prospective 6, controlled 3, compared to historical control 2, prospective and controlled 1. The methodological quality of these studies was found to be very poor. With one exception, the published studies demonstrated the efficacy of physical exercises in reducing both the rate of progression or the magnitude of the Cobb angle at the end of treatment.

Discussion
It has to be borne in mind that the low-quality studies represent the source of the only data that an extensive search of the literature was able to produce. Thus, the results are not always reliable, and the conclusions that can be drawn are limited. Moreover, the design of the studies was not always ideal, and the results were often not statistically significant. Despite this, the studies that were considered showed a trend towards a reduction in the rate of progression of the curve size in the PEE groups. The results of these studies were, if compared with the natural history of the condition, as favorable as the ones given by studies in which there was no control group. From a clinical point of view, the most important papers are those proposed by den Boer, who obtained the same results in the PE group as in the comparison group.

Conclusions
Although the conclusions drawn from the studies are limited, they do suggest that PEEs may be an effective treatment for AIS. Further research is needed to confirm these findings and to determine the optimal type and intensity of exercise. However, the results are promising, and PEEs are a safe and effective option for the treatment of AIS. Therefore, it is important to conduct further research to confirm these findings and to determine the optimal type and intensity of exercise.

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