

Pulmonary functions of conservatively treated patients with adolescent idiopathic scoliosis – A systematic review and meta-analysis.

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Introduction

Some studies have shown that teens with adolescent idiopathic scoliosis (AIS) display pulmonary impairments although conflicting findings have been reported. To better identify and manage AIS patients with pulmonary impairments, a meta-analysis is warranted to summarize the correlations between various lung function parameters and structural features of these patients.

Objective

To summarize the associations between various lung function parameters and radiographic phenotypes of patients with AIS.

Methods

Candidate publications were identified from eight electronic databases, from inception to November 2016. Two independent reviewers screened the titles, abstracts, and full-text of potential articles based on the eligibility criteria. Another two independent reviewers extracted relevant data and appraised the methodological quality of the included studies using relevant risk of bias assessment tools for case control studies, cross-sectional studies, and longitudinal studies.

The relations between various pulmonary parameters and spinal parameters were summarized qualitatively. Meta-analyses were conducted using random-effects models, if appropriate.

Results and discussion

Of 1,045 identified citations, 18 studies (3,075 participants) met the inclusion criteria. Fourteen included studies (2,766 patients) reported significant low-to-moderate associations between diverse spinal deformity parameters (e.g., axial vertebral rotation) and lung functions (e.g., percent predicted functional vital capacity (%FVC), percent predicted forced expiratory volume in one second (%FEV₁), and percent predicted total lung capacity (%TLC)) in patients with AIS. Three included studies showed that patients with impaired lung functions (<65 %FEV₁ or %FVC) had significantly larger thoracic Cobb angles and less thoracic kyphosis than healthy controls. Homogenous data from 10 studies were pooled for meta-analyses. The results showed that larger thoracic Cobb angles were related to lower %FVC (r = -0.34; 95%CI: -0.39 to -0.29), lower %FEV₁ (r = - 0.33; 95%CI: -0.39 to -0.27), smaller %TLC (r = -0.19; 95%CI: - 0.25 to -0.13), and smaller percent predicted vital capacity (r = -0.28; 95%CI: -0.34 to -0.22). Conversely, thoracic kyphosis angles were positively associated with %FVC (r = 0.11; 95%CI: 0.07 to 0.15), %FEV₁ (r = 0.23; 95%CI: 0.18 to 0.27), and %TLC (r = 0.19; 95%CI: 0.15 to 0.24). Many included studies had suboptimal methodological quality. Notably, many of them did not justify the sample sizes. They also did not report response rates, information about ethics approval, and confounders.

\Conclusions

Severe spinal deformities were found to be related to clinically significant pulmonary impairments in patients with AIS. Future studies should consider the influences of other factors (e.g., physical activity levels) in restoring the lung functions of these patients by non-surgical and surgical means.